

# MACHINE TOOL BLUE BOOK

FEBRUARY 1945

**ANNOUNCING**

## *A Revolutionary New Method of* **GEAR CUTTING**

Designed for quantity production of gears, the Michigan "Shear-Speed" process represents the first major advance in almost half a century in the roughing and semi-finishing of spur gears, helical gears, shoulder gears, straight side splines, involute splines, etc.—all of which the "Shear-Speed" will handle interchangeably.

*Ask for Bulletin SS-44*

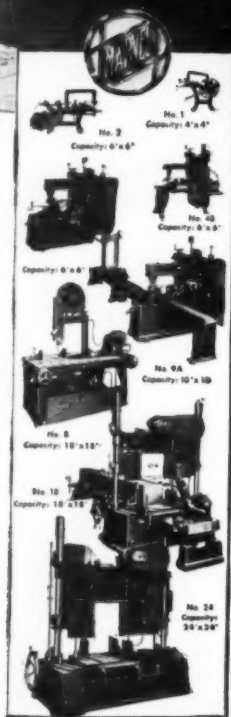
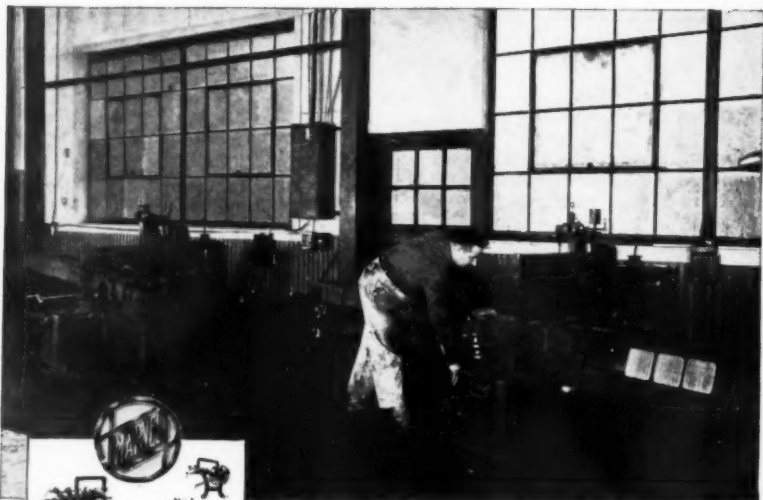


**MICHIGAN  
TOOL CO.**

7171 E. McNICHOLS RD.  
DETROIT 12, MICHIGAN



WITH THE MICHIGAN "SHEAR-SPEED"  
(PATENT PENDING)



## KEEP 7 STEAM HAMMERS SUPPLIED WITH FORGING STEEL

At the Cicero plant of the Atlas Forgings Company, two MARVEL No. 9 High Speed Hack Saws, equipped with heavy duty work handling equipment keep 7 steam hammers supplied with forging steel. The Atlas Forging Company (like most of the other leading forge plants of the country that have accepted MARVEL Saws as standard), have found that the hack saw method of cutting steel TO EXACT WEIGHTS is far more efficient and economical than with any other method formerly used by the industry.

With these two MARVEL High Speed Saws one operator can keep 7 hammers supplied with EXACT SIZE steel and still have time for other work. The initial investment is small—and the cost per cut is unbelievably low. Contrast this with the old method of cutting-off, not requiring an extra heat, frequently with a resultant greater loss of steel.

The MARVEL Saws shown above have found special favor with the forging industry and Machine Shops where heavy demands are put on hack sawing machines. This MARVEL Saw, with its rugged work handling equipment, will stand up under the heaviest punishment and for continuous 24 hour operation.

Write for Bulletins

**ARMSTRONG-BLUM MFG. CO.**

*"The Hack Saw People"*

5700 W. Bloomingdale Ave., Chicago 39, U. S. A.  
Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

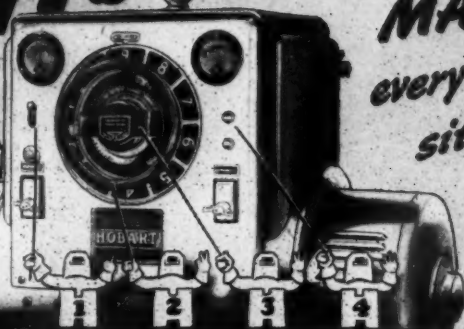
**MARVEL SAWS**





# HOBART

helps you  
**MASTER**  
every welding  
situation.



**SAVE Time  
and MONEY in your  
Redesigning!**

... use this  
new arc welding design  
service in drafting room  
and shop.



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"PRACTICALLY AUTOMATIC." is what welders everywhere are saying about the Hobart Multi-Range Dual Control Arc Welder. Of course they know an automatic arc welding generator is out of the question for the present. However, they find Hobart the nearest thing to automatic on the market today. Figures above indicate the features that are responsible for the fine, close control you get with a Hobart. (1) Convenient and simple switch for changing polarity to suit the different types of electrodes. (2) Outer wheel and dial for selecting the desired welding range. It provides 10 steps which, with the 100 steps in the inner wheel, make possible a wide range of 1,000 volt-ampere combinations. (3) Inner wheel and dial for adjustment of heat and of relation between voltage and current. Removable for Remote Control. (4) Starting switch located inside turret top. Start, stop and reset buttons on outside of cabinet. Switch fully protected against overload, under-voltage and conditions of phase unbalance in power supply.

**HOBART BROS. CO. Box TB-15, TROY, O.**

One of the World's Largest Builders of Arc Welding Equipment

## HOBART

"Simplified"

### ARC WELDERS



**FREE!**  
*Vest Pocket  
Guide for  
Welders*

Handy information  
that all  
welders will use  
daily. Tables,  
charts, etc.



☐ Check here for catalog showing the Hobart line.

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☐ Electric Drive Welder  
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**BUY MORE BONDS  
FOR VICTORY**

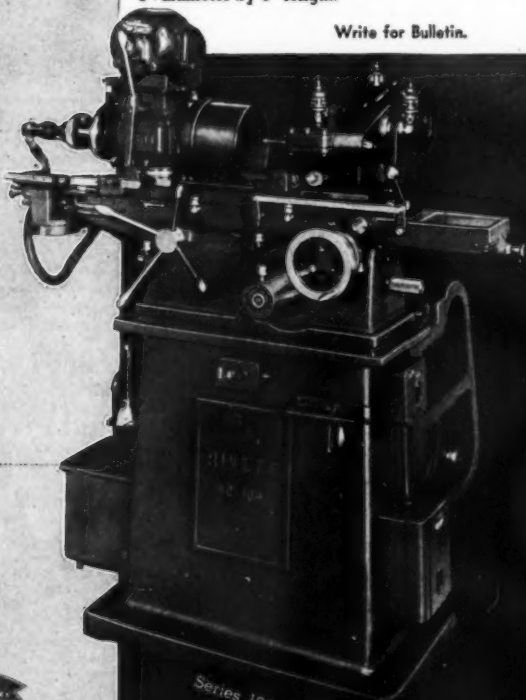
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## **INTERNAL-EXTERNAL GRINDERS FOR DIE AND TOOL-ROOM WORK**

Rivett grinders are particularly suited to the diversified work of the tool-room. Available internal and external spindles, ease of set-up and many adjustments, make practical a wide variety of grinding operations.

Two sizes of Rivett grinders are offered to cover the normal range of tool-room work. Series 104 has grinding capacity up to 3" diameter by 4" length. Series 112 has grinding capacity up to 8" diameter by 8" length.

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Series 104



### **RIVETT LATHE & GRINDER INC.**

BRIGHTON BOSTON MASS U S A

**HARDINGE**  
ELMIRA, N.Y.



**SPECIFICATIONS:**

1" collet capacity, 9" swing, 16" center distance, sixteen spindle speeds from 27 to 1750 r.p.m.

# HARDINGE

High Speed Precision  
TOOL ROOM LATHE

When tool room collet work with one inch diameter or less is done on heavy lathes designed to produce large work, here is what happens—time is lost, machines lose money by under-capacity production, excess power is consumed for the work involved and floor space is wasted.

For profits proportionate to machine invest-

ment, use the proper size tool room lathe comparable to the work involved.

To have complete information on a precision machine designed for speedy turning, boring and threading, obtain a copy of our bulletin illustrating and describing the above unit.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE



# Machine Tool Blue Book

Hitchcock Publishing Co., 542 So. Dearborn St., Chicago 5

Published Monthly

Volume 41, No. 2

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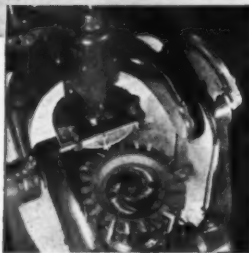


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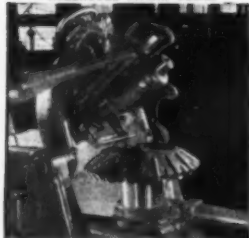
# The INGERSOLL CUTTER GRINDER



CONVENTIONAL FACE MILL



INGERSOLL SHEAR CLEAR



DOUBLE ANGULAR CUTTERS



THE INGERSOLL CUTTER GRINDER is particularly designed for grinding Face Milling Cutters. It grinds at a single setting of the cutter the face, periphery, and corners of cutters from 4 inches to 30 inches in diameter and having a maximum peripheral face of 7 inches. It will also grind solid shank, radius, staggered tooth, and angular inserted blade cutters. It is fast, accurate, and may be operated by the average mechanic. The technique for grinding milling cutters is simple and easily followed when thoroughly understood.

THE NEW MANUAL pictured below shows, through illustrations, the wide range of application of this machine and assists the operator in the best methods of grinding. A copy of this interesting book will be mailed to you upon request.



THE INGERSOLL MILLING MACHINE CO. ROCKFORD ILLINOIS

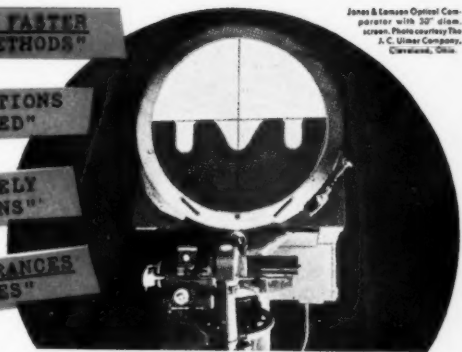
**"INSPECTS 200X FASTER  
THAN FORMER METHODS"**

**"NO CUSTOMER REJECTIONS  
SINCE INSTALLED"**

**"CHECKS ACCURATELY  
IN ALL POSITIONS"**

**"CHECKS .0002" TOLERANCES  
ON CONTOUR GAGES"**

Jones & Lamson Optical Com-  
parator with 30" diam.  
screen. Photo courtesy The  
J. C. Uimer Company,  
Cleveland, Ohio.



**T**his, in brief, is what a manufacturer of precision tools and gauges has to say about his Jones & Lamson Optical Comparator. The record speaks for itself, but it is just one of hundreds of instances where the use of these Comparators has resulted in inspection economies, better products and satisfied customers.

Form tools, gauges and other products with complex or multiform contours can be checked and measured in all dimensions with the standard measuring attachments of Jones & Lamson Optical Comparators.

Or, the inspection of large quantities of duplicate parts can be made rapidly and accurately, by comparison with a master outline drawn upon the glass screen, on Comparators designed specifically for this purpose. There is a model for every job, and the results are beyond a shadow of a doubt.

For the method best suited to your own needs, consult a Jones & Lamson inspection engineer. There is one near you, and he is backed by an organization with over 20 years experience in optical inspection.



This book "Beyond a Shadow of a Doubt" will tell you more about our Optical Comparators and what they are doing.



**JONES & LAMSON**  
MACHINE COMPANY  
Springfield, Vermont, U.S.A.



Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

# HIS NEXT SETUP

## MAY BE AN INTERNAL JOB

With a CINCINNATI Hydraulic Universal you can handle a wide variety of precision grinding operations—external, internal and face. And changing from one to another takes only a few minutes. For example: When an internal grinding job comes along you simply pull down the Internal Grinding Attachment, fasten one hold down bolt and go ahead. This attachment, clearly visible in the illustration at the right, is driven by an independent motor and is standard equipment on all Hydraulic Universals. When not in operation, it is up out of the way, but always ready for instant use. ¶ You can depend on CINCINNATI Hydraulic Universals with their FILMATIC Spindle Bearings and other refinements to give you faster setup, faster handling, faster grinding, faster sizing, low maintenance, extreme accuracy, fine finishes on a wide range of work. Investigate today!

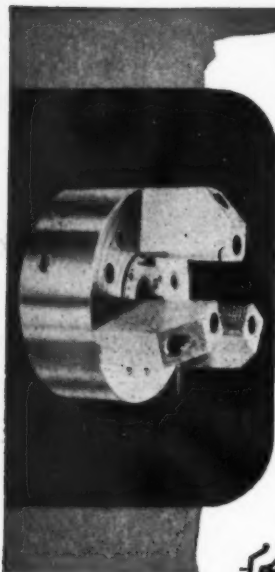
*If you have a grinding problem, talk it over with our engineers. They will be glad to give you the benefit of more than twenty years' experience in both centertype and centerless grinding.*







Above: Grinding the shank end of a long gu boring drill on a 12" Hydraulic Universal. (Catalog illustration shown at the left.) These grinders are available in 12", 14", 16" and 18" swings; and 36", 48" and 72" between-centers lengths. Catalog G-486-1 for 12" or G-474 for larger machines will be sent on request. Brief description of these machines is given Sweet's Catalog File.



"AIRGRIP" REVOLVING AND STATIONARY AIR CYLINDERS can run for years without attention. Wear automatically taken up by pressure within cylinder. Double ball bearings on Revolving Air Cylinder permit speeds formerly impossible.



# Cut Machining Costs

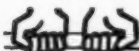
For P. W.\* Competition  
by Equipping Your Lathes with

## Airgrip CHUCKS

THE SPEED AND HOLDING POWER OF AIR  
PLUS cam-wedge locking

\*P. W. Post-War

Lower machining cost is a Post-War MUST! Install unit-cost-cutting "Airgrip" Chucks for easier, simpler, faster machining.



### "AIRGRIP'S" TWO-FISTED GRIPPING POWER

- Cuts Machining Costs
- Reduces Set-Up Time
- Increases Output
- Permits Heavier Cuts
- Capacity up to 100% . . . Coarser Feeds
- Eliminates Slow, Difficult Manual Chucking

"Airgrip's" Two-Fisted action provides double gripping-power . . . Air PLUS a 2-way cam-wedge action. Locks jaws mechanically when gripping externally or internally. Even if air is cut off, double locking holds work securely, prevents spoilage and delays.

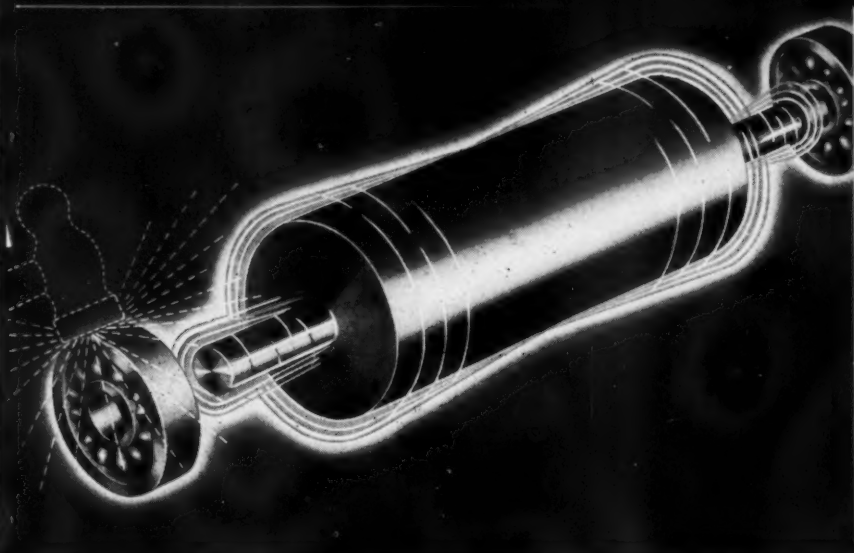
**OTHER ANKER-HOLTH COST-REDUCERS** include Air Operated Collers, Arbors, Mandrels, Drill Press Chucks, Finger and Compensating Chucks (2- and 3-jaw), Valves, Lubricating Assemblies, Revolving and Stationary Air Cylinders, Foot Valves, etc Also Hydraulic Pressure Units and Fittings.

Write, mentioning products on which you desire Bulletin.

## Anker-Holth MFG. CO.

2729 Connors Street

Port Huron, Michigan



## *What a beating these bearings would take!*

**T**HIS is what you may not see when an armature—or any other high speed part—is snugly mounted on its bearings. But you may be sure that the "whip" or "throw" caused by unbalance will deliver a blow at every revolution. And the higher the R. P. M., the harder the blow.

Call it "vibration" if you wish. But remember that vibration means punishment for any high speed assembly . . . punishment that strains, wears, and shortens the life of vital parts.

To eliminate this unbalance and vibration is the job which Gisholt Dynetric Balancing Machines accomplish more quickly, more easily, and more accurately than ever before. If your product can be improved by it, write for full information.

**GISHOLT MACHINE COMPANY**  
1185 East Washington Avenue • Madison 3, Wisconsin

*Look Ahead . . . Keep Ahead . . .  
With Gisholt Improvements*



DYNETRIC BALANCING first enables you to locate the point of unbalance; then measure it for accurate correction. Electronic tubes amplify unbalance vibrations as much as 1,600,000 times.

If you're fishing for specials  
drop a line to Apex!

What it takes to build Socket Wrenches—we have. Hex or square... standard or special nuts... power or hand driven... it's all the same to Apex. We're tooled up for speed and flexibility.

Some very unusual nut running problems have been put up to us. For most of these we have been able to design and build special

sockets and wrenches that solve these very unusual problems.

*Drop us a line!* We can probably be of assistance to you.

Apex also makes Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft and Commercial Universal Joints.

**APEX**

Socket  
Wrenches

THE APEX MACHINE & TOOL COMPANY • DAYTON 2, OHIO



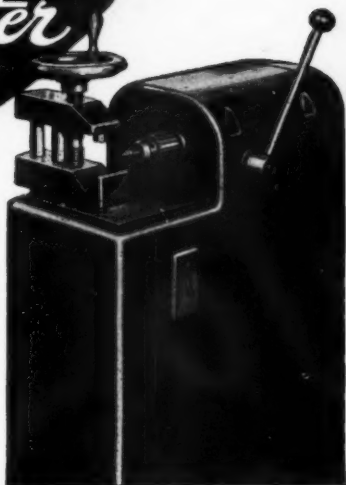
Parts and Supplies  
You Save Time and Material  
— and INCREASE  
Your Shop Output With the

# MURCHEY

*Quickcenter*

**T**HIS machine is a speedy, easy and accurate performer. It's so easy to use that any workman can handle it. You simply insert one end in the Vee-Block, tighten the hand wheel and advance the center drill—then reverse the bar and center the other end. The **Quickcenter** will do in less than a minute a job that may take over half an hour on a lathe—and do it far more easily and more accurately. The **Quickcenter**, small and compact, increases shop output, uses unskilled operators, saves time and material—and increases your profit.

*Write* for detailed information to Dept. M-2  
**MURCHEY MACHINE & TOOL CO.**  
DETROIT 26, MICH.



( From 1/2 inch to 3 inch Round Bars )

# MURCHEY

# Get Easier Cutting and Longer Saw-Life

ON MAGNESIUM, ALUMINUM, PLASTICS, HARD WOOD



...use  
**SIMONDS**  
New "Skip-Tooth"  
Hard Edge  
Metal Band Saws

Soft materials like the light metals, plastics and wood all turn up extra-large chips when cut. So saws used in this type of cutting need extra-large gullets to clear these big chips... saws like Simonds Skip-Tooth Band Saws. This type of saw has coarse teeth... 2, 3, 4 and 6 per inch... yet the gullet is shaped so that even the narrower blades have maximum strength in the body, the teeth only being hardened. So you can bank on it

that these new Skip-Tooth Saws will stay sharp so long that you'll get your money out of them long before they dull... which means you can economically replace with new blades and cut out all sharpening costs. See your dealer or write direct; to Simonds.

BRANCH OFFICES: 1350 Columbus Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 416 West 8th St., Los Angeles 14, Calif.; 31 W. Trent Ave., Spokane 8, Wash.

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PRODUCTION TOOLS  
FOR CUTTING METAL,  
WOOD,  
PAPER, PLASTICS

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SAW AND STEEL CO.

FITCHBURG, MASSACHUSETTS

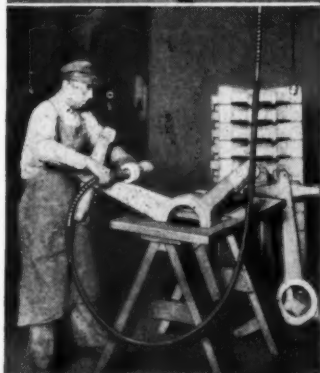
# Jarvis POWER TOOLS

The "POWER HANDS" of  
the metal working industry

## JARVIS Flexible Shaft Machines

Jarvis Multiple and Single Speed Flexible Shaft Machines are the universal "power hands" for the metal craftsman. When used with the correctly selected Jarvis Rotary Tools they are suitable for filing, grinding, polishing, buffing, sanding, and cleaning operations. Jarvis Flexible Shaft Machines are furnished to meet every requirement for bench, floor, and overhead type installations. There is a Jarvis Rotary Tool to fit your needs.

Send for our new catalog MFTI



**THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.**

TAPPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES  
QUICK CHANGE CHUCKS AND COLLETS

# KEEP 'EM ROLLING **FASTER**

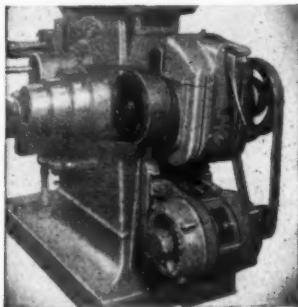
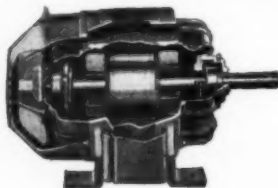
WITH

## TORQ **MOTORS AND DRIVES**

Speed up! Produce more pieces per hour with Torq-Qua-Matic Transmissions. Combined with Torq Motors, they provide a superbly efficient motorized unit that will modernize your machine tools and bring them up to present and post-war production standards. Lathes, milling machines, screw machines and other standard machine tools are quickly, easily and inexpensively modernized with Torq Motors and Drives.

Standard and Special sizes from 1 to 15 H.P. for all standard machine tools.

**PROMPT DELIVERIES** — Both Torq Motors and Torq-Qua-Matic Drives are available now for prompt delivery . . . **from stock** in most cases!



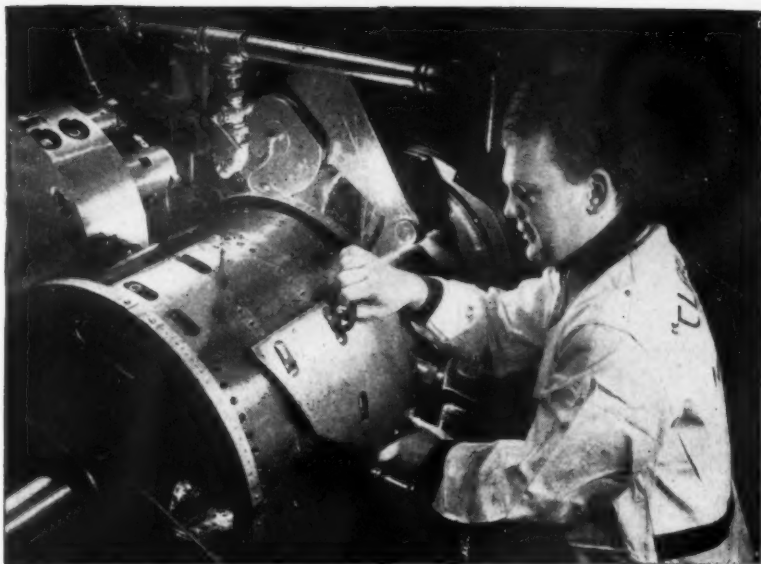
*Send for Informative Catalog.*

**THE TORQ ELECTRIC**  
6605 CARNEGIE AVE.



**MANUFACTURING CO.**  
CLEVELAND, OHIO





## Cost Saving Starts Here . . . On CLEVELAND AUTOMATICS

This is a picture of a familiar critical stage in automatic machining — the set-up. On a Cleveland Single Spindle Automatic Machine this important element of cost is reduced to unusual simplicity by Cleveland's exclusive Universal Camming feature. It's just as easy as it looks.

Standardized cams, designed to impart the correct forward action and rapid traverse return to the tools, are so quickly and easily adjustable that even small lot short run jobs can absorb the set-up time with profit. Add to this the high speed of Cleveland Automatic production on bar and tube stock from 1-1/16" to 10" and you find that Cleavelands have universal economical application. Let a Cleveland production engineer give you a "cost figured" illustration of Cleveland advantages on YOUR type of production.

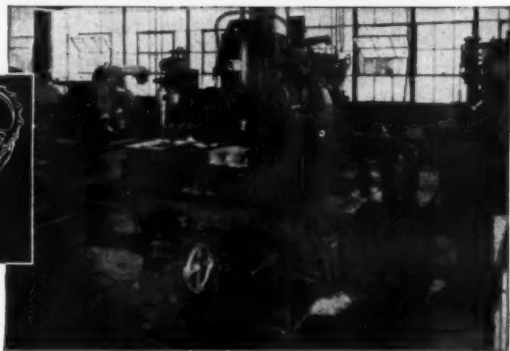
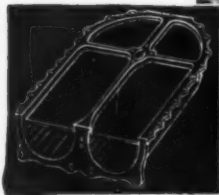
*Just Remember . . . Cleavelands Cut Costs*

**THE CLEVELAND AUTOMATIC MACHINE CO.**

2277 Ashland Road • CLEVELAND 3, OHIO

BRANCHES: Chicago • Detroit • Newark • Cincinnati • Hartford

# How TO AVOID BUYING EXPENSIVE MACHINES FOR CONTOUR JOBS!



*"Turn to Turchan"*

**I**N cutting contours, the Turchan Follower Attachment can frequently be used with machines which you already have in your plant, thus avoiding the expense of buying special machines costing several times as much.

One of the numerous examples of the Turchan's adaptability to work of this character is seen in the above illustration which shows a vertical mill being used to mill the interior contour and outside flange of a 14" x 14" carburetor housing.

If you have a prospective job of finishing parts of irregular or eccentric shape, and would like to find out how you can avoid buying a special machine, here's what to do!

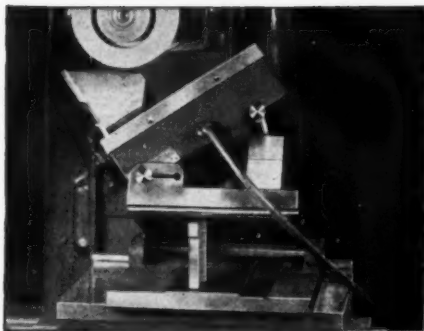
## Investigate the Turchan Follower Attachment!

Send us a blueprint or sample of part, together with information as to what machines you have—milling machines, lathes, grinders, shapers or boring mills—and we will show you how a Turchan Attachment will do the job.

# TURCHAN

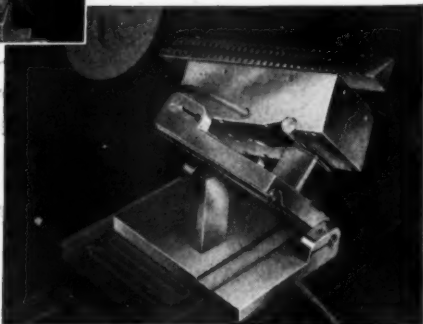
**Turchan Follower Machine Co.**  
8253 Livernois Detroit 4, Mich.

## Hydraulic Follower Machine



**75 MINUTES  
SAVED HERE**

**55 MINUTES  
SAVED HERE**



*You Save*

**ON EVERY ANGULAR GRINDING  
JOB WITH THE MAGNA SINE**

The most complicated angular grinding set-ups can be completed in a matter of seconds with the Magna Sine in contrast with the hour or more often required using conventional methods. In most shops these substantial time savings will pay for the Magna Sine in a very short time . . . sometimes on the very first set-up.

And the Magna Sine saves in other ways too. The gage block and sine bar method of determining angles plus the extreme accuracy of the Magna Sine itself provides the most accurate of set-ups. The work piece is held securely at the turn of a switch. There are no clamps to slip or distort the part or set-up. Scrapped work from poor set-up is eliminated. Every grinder doing an average amount of angular grinding work should be equipped with a Magna Sine.

Write today for full information on the Magna Sine and its companion unit, the Robbins Non-magnetic Sine Plate used for inspection, jig boring, and similar work. Both are built on the same principles and with the same accurate, sturdy construction in two sizes and two models.



**Robbins ENGINEERING COMPANY**

318 MIDLAND AVE.

DETROIT 8, MICHIGAN

MODERNIZE with . . .  
**Live Centers**  
 ECONOMIZE with . . .  
**Motor Tool**

THE  
 CENTER  
 OF  
 ATTRACTION

LOCK FOR REDRESSING  
 POINT WITHOUT  
 DISMANTLING.

NEEDLE BEARING FOR  
 TRUE RUNNING AND  
 PREVENTION OF CHATTER.

CORK THRUST PAD COM-  
 PENSATOR FOR HEAT AND  
 EXPANSION OF WORK.

HEAVY DUTY BALL  
 BEARING FOR GREATER  
 THRUST LOAD.

HEAVY DUTY ROLLER  
 BEARING FOR GREATER  
 RADIAL LOAD CAPACITY.

LARGE SPINDLE  
 FOR STURDINESS AND  
 GREATER LOAD.

GREASE SEAL TO  
 RETAIN LUBRICANT  
 AND KEEP OUT  
 FOREIGN MATTER.

In high speed cutting operations  
 the use of "live" centers is more  
 economical . . .

Stationary or "dead" centers  
 develop friction, have a tendency  
 to overheat or burn out  
 frequently must be replaced

"Live" centers run COOL because  
 they rotate with the work  
 continue on job after job

**MOTOR TOOL MANUFACTURING CO.**  
**METAL CUTTING TOOLS**  
 7773 CORTLAND AVENUE • DETROIT, MICHIGAN

*Make it a Rule  
 to Call Motor Tool*

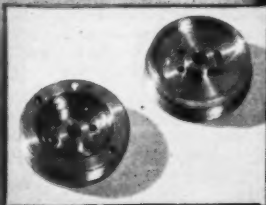
THE MIND OF THE ENGINEER

IS A BUSY PLACE

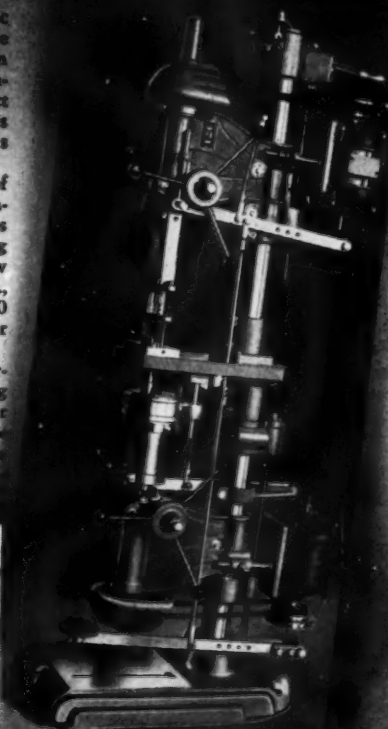
**ADAPTATION**—basic universal law—has been the key to the genius of American war production. And particularly in the use of compact efficiency of small machines have American engineers been most clever.

An interesting example of such thinking is the adaptation of two Atlas drill presses for simultaneously drilling both slues of the part below by the Bastian-Blessing Co., Chicago. Production: 500 pieces — 4,000 holes — per hour.

Are there similar opportunities for such engineering ingenuity in your war or peace-time production? The latest catalogs will give you the Atlas tool specification you need.



ATLAS PRESS COMPANY  
250 N. Fisher Street  
Kalamazoo 120, Michigan

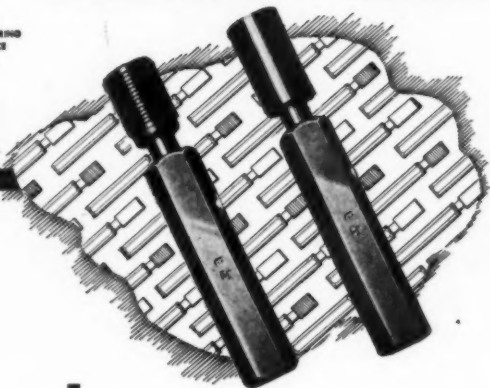




## **DOUBLE ECONOMY**

BY THE USE OF

# **LINCOLN PARK CARBOLOY GAGES**



• At Least 50 Times the Useful Inspection Life of Ordinary Steel Gages.

• Unvarying Accuracy in Inspection of Parts Produced Extremely Close to Required Limits

In the many plants where Lincoln Park Carboly gages are being used for the inspection of parts produced in mass volume, records invariably show savings of thousands of dollars in gage costs alone. This is the result of greater wear-resistance and longer gage life which, in some cases, has exceeded 200 times that of steel gages.

In addition, even greater savings—which cannot be actually recorded—are made possible because Lincoln Park Carboly gages can be specified extremely close to required limits. With wear allowances reduced to a minimum, manufacturing tolerances are automatically increased. Important and expensive parts made to close limits are not rejected because of inaccurate inspection with gages of other materials which must be produced to allow for customary wear.

Carboly plug, ring, thread plug, and sizing gages and many precision tools are promptly available from Lincoln Park—the company that has had wider experience in the use of this wear-resistant material for precision applications than any other manufacturer. Our new catalog contains complete information. Write for it today.



## **LINCOLN PARK INDUSTRIES, INC.**

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

6731 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN



*You can profit* by this man's  
experience!

**T**his is a picture of "Chuck" Calvin in our surface grinding department. He has had years of experience as a specialist in surface grinding. His skill in precision grinding operations has contributed no small part in the development of extreme accuracies and finishes of U. S. Broaches.

But, "Chuck" is just one of the U. S. Broach personnel who contribute their skill and technical knowledge to the design and manufacture of broaches.

And you can profit by the combined experience of these men, because their ability to engineer the job to your particular production requirements, and then execute it exactly as engineered, effects definite savings for you in man hours and production time.

Perhaps you have metal cutting problems that can be performed more efficiently by broaching operations. If you have, may we suggest you write our sales department today for information about our complete designing service.

★ Write today for our 4-color brochure. It contains technical information you'll want for ready reference. ★

**U.S. BROACH**  
*Company*

4467 E. SEVEN MILE ROAD

DETROIT 12, MICH.



TELEPHONE TWINSBROOK 7-2313

*Amazing  
Speed on  
CUT-OFF  
WORK*

*Kalamazoo*  
COOLANT MODEL  
*Metal Cutting  
Band Saw*



A modern, high speed, low cost production unit for cutting off rods, bars, tubes or odd shapes to lengths. Extremely accurate. Narrow kerf saves costly metal. Labor saving automatic operation. No heat generation. Long life for saws.

Coolant attachment is compact and has no messy floor pans.

Portable and plugs in anywhere. Casters optional.

Machine can be furnished without coolant for intermittent cutting.

Two sizes — 8" x 16" and 8" x 24".

*Ask your dealer for bulletin.*

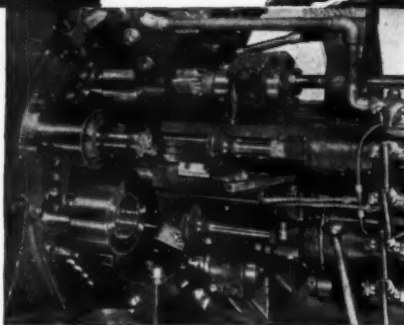
## **MACHINE TOOL DIVISION**

**Kalamazoo Tank & Silo Co., Kalamazoo, Michigan**



# WANTED:

A Machine that can  
work with 15 tools  
at the same time



If you want to run an ad like that, here is an applicant for the job.

It's an Acme-Gridley Chucking Automatic—a machine built for one reason, to cut costs by turning out more precision work in less time.

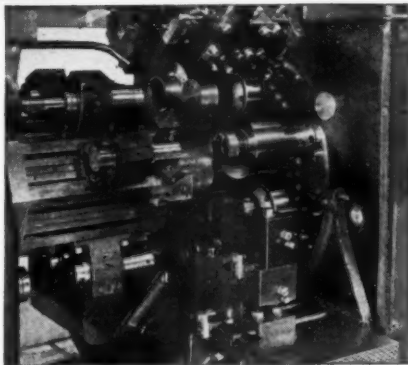
Large, accessible tooling area permits use of more tools working together, with sustained accuracy at high speeds. Efficient chip removal, less operator fatigue. Multiple tooling combines operations—saves time, saves tools, saves floor space, saves investment.

**Here is the 15-handed machinist at work.** The job—machining an annealed cast-iron motor piston, on a 6" 8-spindle Acme-Gridley Chucker.

First operations (shown here), 15 tools, double indexing, with alternate internal and external chucking, permits rough finishing both ends at one setup.

Second operations, 14 tools, double indexing and multiple tooling finishes two pieces at same time.

29 tools required, only two setups needed.



*Write us about your chucking jobs. We'll help you get the costs down.*

## The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-G and 8 Spindle Bar and  
Chuck Automatics • Single Spindle  
Automatics • Automatic Threading Dies and  
Taps • The Chronolog • Limit, Motor Starter  
and Control Station Switches • Solenoids  
Centrifuges • Contract Manufacturing

**"Stark"**



**Integral Drive**

## **PRECISION BENCH LATHE**

*A new stream-liner incorporating  
all the old Stark accuracy and stamina*

**T**HE first tool of its class with built-in Motor and speed changing mechanism (patented). Marvelously compact; nothing under the bench; no special bench or cabinet needed; even bolting down unnecessary.

Simply moving control lever to right engages the clutch, vertical position releases; moving to the left instantly brakes the moving spindle.

Standard (tool room) Model has time-tried double taper spindle bearings 156 to 2200 r.p.m.—the best for sustained accuracy.

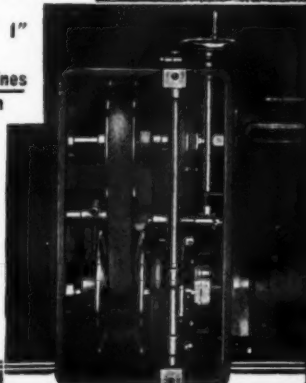
High speed (manufacturing) Model fitted with best precision pre-loaded anti-friction bearings, 260 to 3500 r.p.m.

Both have 40 inch bed, 9 inch swing, 20 inches between centers: either  $\frac{3}{4}$  or 1 inch collet capacity. Take regular STARK Attachments collets and chucks. This Stark (patented) built-in drive, integral with the Lathe itself, employs a  $\frac{1}{2}$  h.p. geared ball-bearing motor drive through a disc clutch, and through V belts to the headstock, giving any split speed at the turn of the small hand wheel in front of operator.

**Open Cone Lathes**  
accurate and reliable  
with motor drive unit

4 good sizes  
 $\frac{1}{4}$ "  $\frac{1}{2}$ "  $\frac{3}{4}$ " & 1"  
9 speeds

**Bench Milling Machines**  
for true precision



Write for full information

**STARK TOOL COMPANY**  
WALTHAM, MASS., U. S. A.  
ESTABLISHED 1862

*Setting New Standards for..*

FOR STANDARD AND  
SPECIAL TOOLS MADE  
TO YOUR BLUEPRINTS

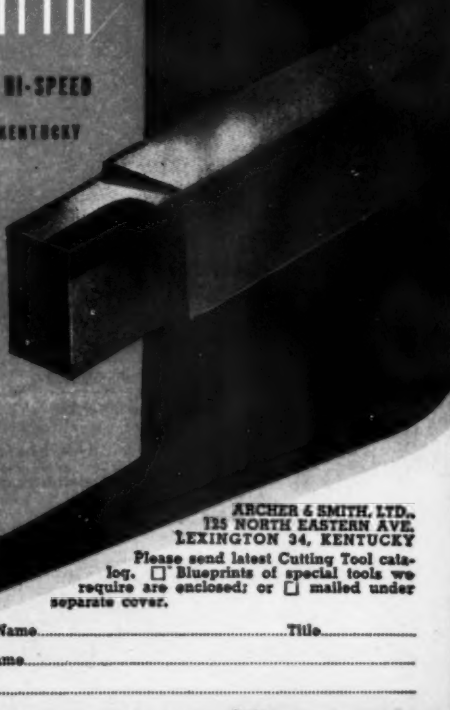
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ARCHER & SMITH  
LIMITED

CARBIDE *Cutting Tools* HI-SPEED

125 N. EASTERN AVENUE LEXINGTON 34, KENTUCKY

With every modern facility for precision production on small and big jobs—standard or special—Carbide or Hi-Speed—with the "know how" bond of years of experience—with a reputation for service and attention to details, Archer & Smith invites your inquiry—and pledges action. Write for catalog. Send blueprints.



- ✓ SPEED
- ✓ PRECISION
- ✓ FINISH
- ✓ LONG LIFE

ARCHER & SMITH, LTD.,  
125 NORTH EASTERN AVE.  
LEXINGTON 34, KENTUCKY

Please send latest Cutting Tool catalog. ☐ Blueprints of special tools we require are enclosed; or ☐ mailed under separate cover.

Name.....Title.....

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State.....

Today machine shops must be equipped to grind odd-shaped forms. To do this precisely requires dressing the abrasive wheel to the desired contour. No. 41 does that, accurately, quickly.

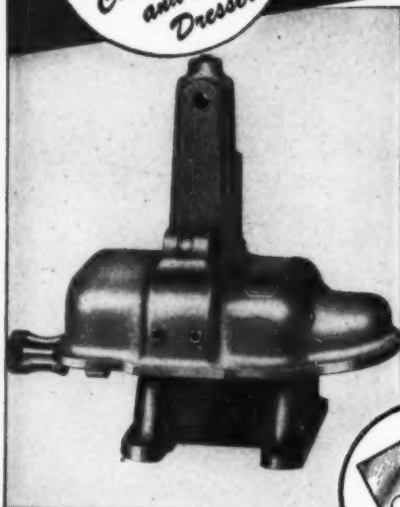
**Introducing  
No. 41  
Contour, Radius  
and Angle  
Dresser**

**At Last... It's Possible!**  
Now Even the Operator of Limited  
Experience Can Dress and Re-dress  
**ABRASIVE WHEELS**  
Accurately and Quickly to  
**ANY CONTOUR!**

### Plus regular radius and angle Dressing

Virtually any desired contour can be generated on abrasive wheels by placing a template of the curve in the clamp of No. 41-B. A spring-activated plunger follows the contour of the template as the operator simply turns the knob. As he turns it, the chisel pointed diamond of the dresser moves across the face of the rotating abrasive wheel, dressing it exactly to the shape of the template.

Flexibility, accessibility of parts for cleaning, and simplicity are among the features of No. 41-A Radius and Angle Dresser made possible by expert engineering design.

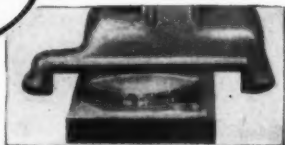


No. 41-B Template Dresser. Rear View.

After the wheel is dressed by the chisel-pointed diamond, it fits the template accurately. When worn, it is quickly re-dressed to the same contour.

With its base, No. 41-A does all the usual jobs of a quality radius and angle dresser. Yet its cost is remarkably low.

Write for Booklet A

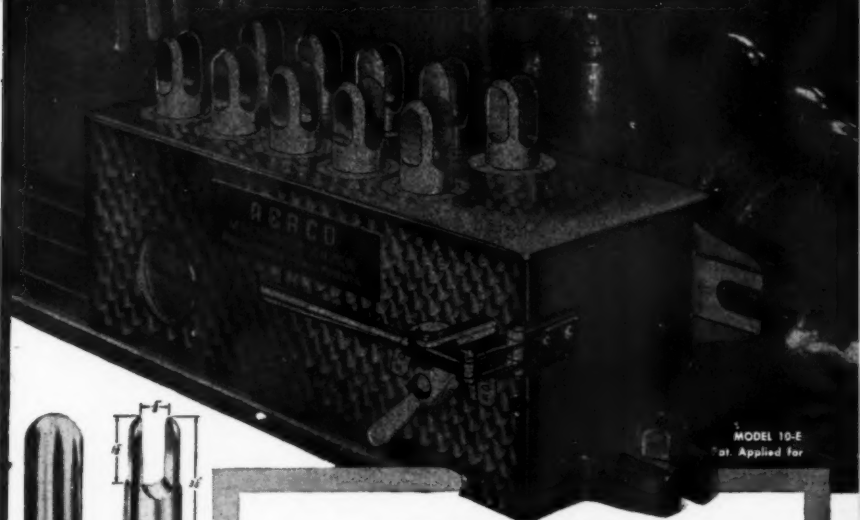


No. 41-A Radius and Angle Dresser. Front View.

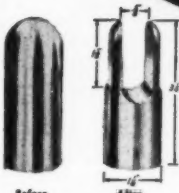


**BEST TOOLS CORPORATION**  
ROCKVILLE CENTER, LONG ISLAND, N. Y.

# INCREASE MILLING PRODUCTION without Added Men or Machines!

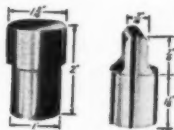


MODEL 10-E  
Pat. Applied for



**Before After**  
**Aluminum Parts**

These aluminum parts were milled upon the Aerco Multi-Grip Chuck at the rate of 355 per hour (floor to floor) as compared with single milling operations of only 71 per hour.



**Before After**  
**Chrome Steel Parts**

These parts, high heat treated of Chrome-moly, were produced at the rate of 62 per hour (floor to floor) on the Aerco Multi-Grip Chuck. Individual milling time was 15 per hour.

These parts milled with the use of the Aerco Multi-Grip Chuck show its versatility.

## with the **AERCO HYDRAULIC MULTI-GRIP CHUCK**

Two rows of collets hold ten parts and both rows are milled simultaneously and with but a single loading increasing production as much as 500%.

Self-centering aligning collets insure perfect on-center milling regardless of slight shank diameter variations. Safety stop prevents damage to collets should all stations not be loaded.

Aerco Multi-Grip chucks may be used for both vertical and horizontal milling. Work is held rigidly in collets and cannot turn or be pulled out during milling operation, however clamping pressure is instantly releasable and self-opening collets can be quickly re-loaded.

Collet sizes range from  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " and are available in round, square or hexagon shapes.

**Representatives Wanted in Principal Cities**

MANUFACTURED EXCLUSIVELY BY



HOLLYDALE, CALIFORNIA

WRITE FOR NEW FOLDER



**LEAD SCREWS**  
**ACCURATE**  
 TO .0002" IN 16 INCHES



**Speed table settings on the**  
*Moore Jig Borer*

Accurate lead screws built into the Moore Jig Borer *mechanically* guide the work to precise location within .0001" *at a turn of the micrometer dials*. This exclusive principle in Jig Borer construction reduces the margin of human error on table settings and simplifies operation. The built-in accuracy of the lead screws also assures *constant* precision, unaffected by the temperature fluctuation encountered in the use of exposed size blocks or end measures.



Moore methods of hardening, seasoning, stabilizing, thread-grinding and lapping enable the cross and longitudi-

nal lead screws to give hole-location accuracy of .0002" over 16 inches of travel and .00005" from any given inch to the next.

With such dependable precision, table settings can be made rapidly and accurately in any position by the coordinate location method. On the Moore Jig Borer, you can spot, drill, bore and ream *all* holes in the work-piece consecutively, with minimum tool changes, eliminating the conventional stop-and-start to change tools at each hole.

Ask for your free copy of "Grinding Lead Screws—Accurate to .0002" in 16 inches" and descriptive literature.

**MOORE SPECIAL TOOL CO., INC.**  
 728 UNION AVENUE, BRIDGEPORT 7, CONN.

**MOORE JIG BORER**



(SPOTS, DRILLS, BORES, REAMS...WITH MINIMUM TOOL CHANGES)

# The Fastest Production Tool Grinder on the Market \*

*\*Actual statement of a user of several machines.*

For all types of tool and cutter sharpening — A real production grinder on which you can sharpen your cutting tools in less time as compared to other methods. Just two simple fixtures needed to handle the general run of cutters.

\* \* \*

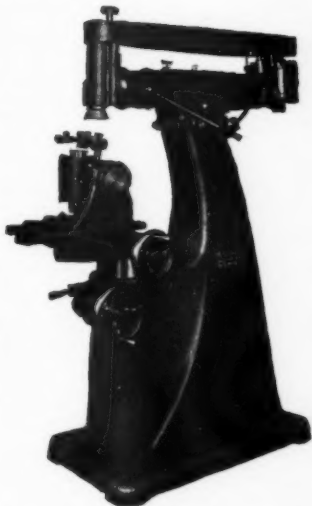
The Ace is easy to set up — fast and simple to operate — operator stands in a comfortable position — clearance by direct reading — radial relief if desired.

\* \* \*

The Ace is doing a BANG UP job for both Cutter Manufacturers and Users. Its many features will appeal to you. Make your next cutter grinder an OLIVER ACE.

**Don't Neglect  
Your Toolroom  
It's the Backbone  
of Production!**

**OLIVER**  
**OF ADRIAN**



Cut illustrates the ACE Universal Tool and Cutter Grinder with Anti-Friction Head — handles a complete range of cutters and tools.

*Send for Literature Today.  
Prompt Deliveries.*

**OLIVER INSTRUMENT CO.**  
1408 E. MAUMEE ST. ADRIAN, MICHIGAN

AUTOMATIC DRILL GRINDERS — TOOL  
AND CUTTER GRINDERS — DRILL  
POINT THINNERS — TEMPLATE  
TOOL GRINDERS — FACE MILL  
GRINDERS — DIEMAKING MACHINES

# CRITERION *Boring* HEADS

**RIGID**



*Smooth*

**COMPACT**

Highly favored by operators because of their smooth, rigid, compact design. Particularly adapted to the use of carbide tools. Adjusting screw ground from solid AFTER hardening. Gradu-

ated in thousandths, widely spaced, easily read. Criterion Boring Heads are sold throughout the U.S. Order from your dealer. Request free literature.



**CRITERION MACHINE WORKS**  
**BEVERLY HILLS, CALIFORNIA**





## Save these for work a machine can't do



**HC-5**— $\frac{1}{2}$  H. P., multi-speed countershaft unit, 900 to 3600 R. P. M. Mounted bench-height on 3-leg caster base, 360° swivel.



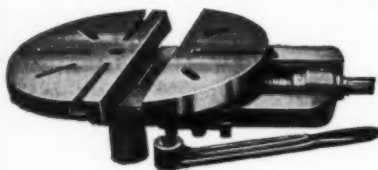
There was a time, not so many years ago, when the words "Made by Hand" were synonymous with highest quality. In some things this still holds true.

But it is equally true that many operations can be done better and faster, with a greater degree of efficiency, when a Haskins Flexible Shaft Machine is used. And this with much less strain and fatigue on the part of the operator.

Grinding—Sanding—Rotary filing—Wire brushing—Buffing and Polishing—all are machine operations. There are many more. Write for Catalog 45, showing many ways to save your hands and speed production with flexible shaft equipment.

**R. G. HASKINS CO.**  
622 South California Ave., Chicago 12

# Use the COMBINATION DRILL TABLE and VISE



## SPEEDS DRILL PRESS SET-UPS

Simplifies the most difficult set-ups. Holds work of all shapes securely, without angle plates, clamps or supports. Just drop in the work and start to drill.

The Combination is made in various sizes — diameters from 8" to 27½", weighing from 27 to 600 lbs. Made of the finest materials, for long life. Easy to install. Specify shank diameter in thousandths of an inch. We supply the drill table and vise with shank turned to size specified.

## GUARANTEE

We guarantee the Combination will save its cost in labor alone in six months. You are the judge.

## FREE TRIAL

We will ship to rated concerns under this guarantee, on free trial. Should you decide not to keep the tool we will even pay return transportation. Order Today!

Circular on Request.



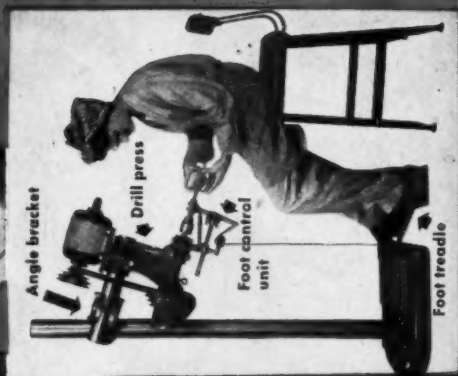
## WRITE TODAY FOR CIRCULAR

*Gives full information and illustrates typical, set-ups. Shows use on radial drills. Complete specifications of all models including the square, all steel tables.*

**MODERN MACHINE TOOL CO.**  
*Jackson, Michigan*

# HERE'S HOW TO QUICKLY REMOVE THE BURRS LEFT BY CUTTING TOOLS AROUND THE EDGES OF HOLES ON MACHINED AND SHEET METAL PARTS!

DOUBLE EDGE  
CUTTING BLADE



New Nوبر foot control greatly speeds Nوبر-ing! Quickly installed on any popular type of drill press, this inexpensive accessory leaves both hands for rapid handling of work. The mounting bracket provides adjustable positioning of spindle to operator's best working position.

You can remove those sharp jagged burrs **FASTER** with NOBUR than by any other method! Simple and easy to use, NOBUR works like a drill — placed in the spindle of any machine tool, burring may be done by unskilled help with complete ease and safety — and as rapidly as parts can be handled. NOBUR eliminates slow, costly hand work. The double-edged cutting blade is of high speed steel and cuts freely in either alloy steels or soft metals.

Write for the complete story of burring this newest, faster way — NOW!



NOBUR MANUFACTURING COMPANY  
910 North Orange Drive, Los Angeles 28, California

# TRUMORE DIAMOND TOOLS

## Have The Following Advantages:



1. The diamonds are long and narrow, cannot wear to a broad flat and therefore remain sharp enough for general purposes.
2. The diamonds extend deep into the steel holder for added security.
3. They continue in service without need of resetting.

**1/2 Carat \$7.50**

**3/4 Carat \$14.50**



**1 Carat \$22.00**

**1 1/2 Carat \$42.00**

Best grade diamonds furnished in any size holder desired.

*Write for illustrated circulars on diamond tools.*

## **F. F. GILMORE & COMPANY**

**285 COLUMBUS AVE.**

**BOSTON 16, MASS.**

# CHICAGO

## STEEL PRESS BRAKES—HAND AND POWER BENDING BRAKES—AND DIES FOR ALL STANDARD MODERN PRESS BRAKES



### BOX AND PAN BRAKE—

Forms boxes or pans from one piece of metal. A straight brake as well as a box brake. Ideal for experimental shops.

All Chicago Brakes are built of rolled steel welded sections which insures great strength, accuracy and long life.

Up to the minute in design and workmanship, they fit the present need for fast production sheet metal working machinery.

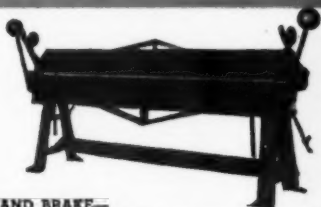
We also build special machines for intricate bending operations.

Take advantage of our experience of over 40 years by sending to us any difficult bending problem you have.



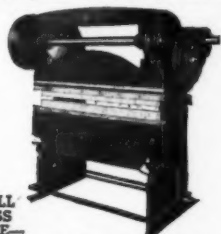
### POWER BENDING BRAKE—

Indispensable wherever a volume of heavy plate work is done—forms a great variety of bends and shapes without dies.



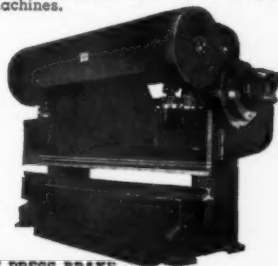
### HAND BRAKE—

Improved to meet modern needs. Efficient and dependable—sturdy and durable.



### SMALL PRESS BRAKE—

Compact, powerful money-saving production unit. Replaces cumbersome costly machines that are expensive to operate. Uses same dies as larger machines.

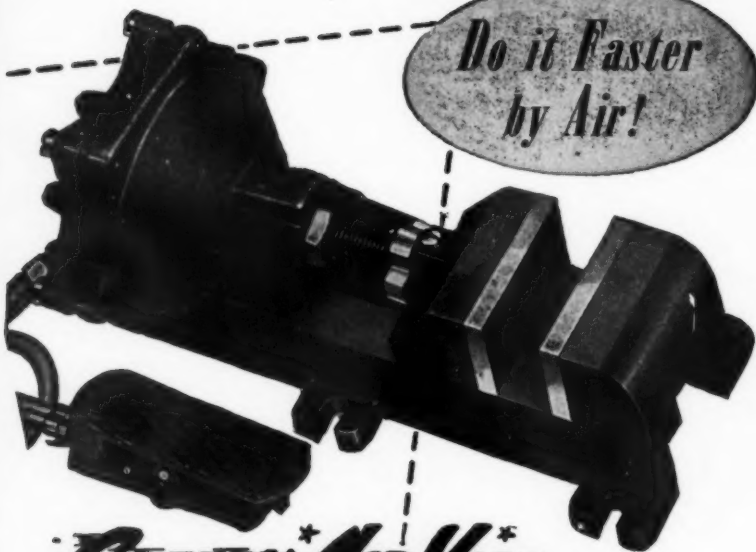


### LARGE PRESS BRAKE—

The only press brake which turns out perfect work without shims and crowned dies. Patented non-deflecting bed equalizes pressure over the full bending length and overcomes major fault in solid bed press brakes.

**DREIS & KRUMP MANUFACTURING CO.**  
7440 LOOMIS BLVD., - - - CHICAGO, ILL.  
SEND FOR NEW BOOK "FORMING PRESS DIES AND THEIR USES"

*Do it Faster  
by Air!*



## ***SPEEDY AIR VISE***

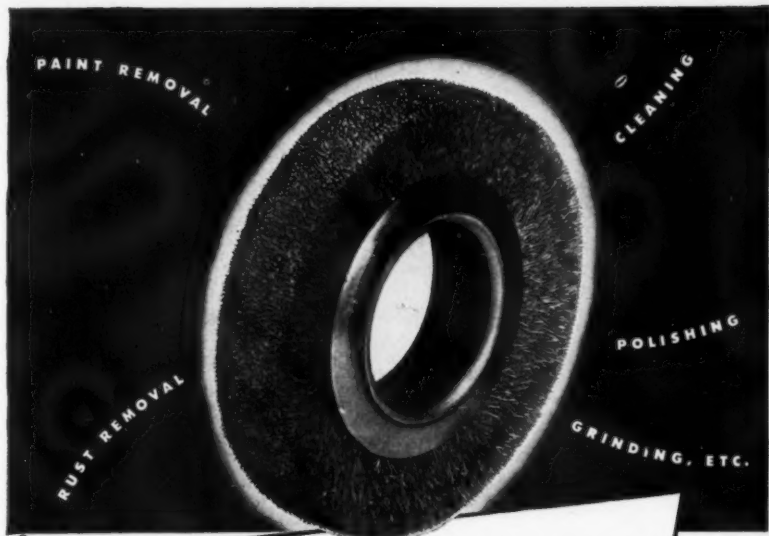
**GRIPPING FORCE 15 TIMES AIR LINE PRESSURE!**

America's war plants are switching to new, powerful Speedy Air Vises! From a single vise . . . to an installation of fifty . . . they are saving time, effort and labor costs! Air operated, *foot controlled*—both hands are left free for more rapid drilling, tapping, light milling, assembly, etc. **\$24**  
Complete with Foot Control Valve, Air Hose and Fittings, only

**DELIVERY 7-10 DAYS! ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT**

 <p><b>AIR REGULATOR</b> Precision-built. Delivers pressures up to 140 lbs. With gauge, \$4. Less gauge, \$2.50</p>	 <p><b>AIR FILTER</b> Keeps water and particles out of the regulator and pneumatic tools. \$1.50</p>	<p><b>BLOW-GUN</b> Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . \$2.50</p> 
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**W. R. BROWN CORP., 5724 ARMITAGE AVE., CHICAGO 39, ILL.**

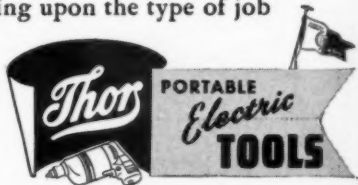


## **Thor** WIRE BRUSHES

*In Popular Sizes*

FOR ALL TOUGH JOBS

Sturdy, long life Thor wire brushes can be had in sizes from 4" to 12" outside diameter. Brush sections are heavily filled with doubly durable crimped wire in gauges of 30 to 36. Scientifically constructed, these modern brushes will operate efficiently at speeds of 2000 to 6000 r.p.m. depending upon the type of job to be done. See your nearby Thor distributor for industrial wire brushes for tough jobs.



INDEPENDENT PNEUMATIC TOOL CO., 600 West Jackson Boulevard, Chicago, Illinois • New York • Los Angeles

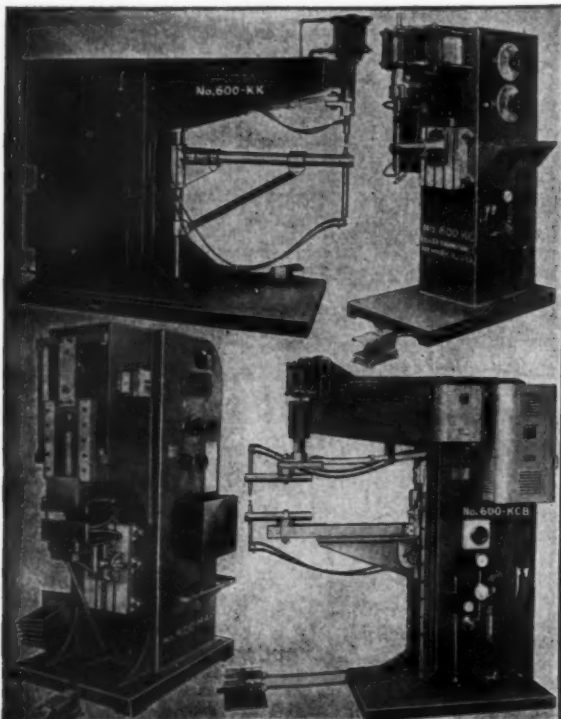
# WELDERS

## SPOT · BUTT · ARC

We manufacture a complete line of resistance spot welders from 1/4 to 300 KVA for all types of welding. There is an EISLER WELDER for every purpose.

WRITE FOR CATALOG

WE INVITE CONTRACT SPOT WELDING IN LARGE OR SMALL QUANTITIES.



**CHAS. EISLER**  
**EISLER ENGINEERING CO.**

762-SO. 13<sup>th</sup> ST. NEAR AVON AVE NEWARK N. J.



**ARC WELDERS**  
 100 TO 400 AMPS.



**BUTT WELDERS**



**SPOT WELDERS**



**SPOT WELDERS**  
 FOOT, AIR  
 OR MOTOR OPERATED



# *Special Purpose Tools* • DESIGNED AND GROUND BY SEVERANCE, SPEED FINISHING IN UNUSUAL APPLICATIONS

## JOB #257-496-A Special Chatterless Ball Seat Reamer

Severance produced this special cutter for finishing ball seats on steering gear tie rod adjusting screws. Made of SAE 1020 steel; this cutter is run at 100 R.P.M.'s on a Screw Machine. This cutter holds its keen cutting edges under long, hard usage and insures close-tolerance reaming.



No matter what your finishing requirements may be, Severance is equipped and manned to produce any type of special cutter to do a superior job quickly. Send blueprints, sketches or a sample of the part to our engineering dept.

## JOB #324-652-D Double Angle Deburring Cutter

This specially designed Severance Cutter quickly removes burrs from two edges of an aluminum part simultaneously. Inserted between the two cutting surfaces is a ring-stop which determines the amount of stock to be removed.

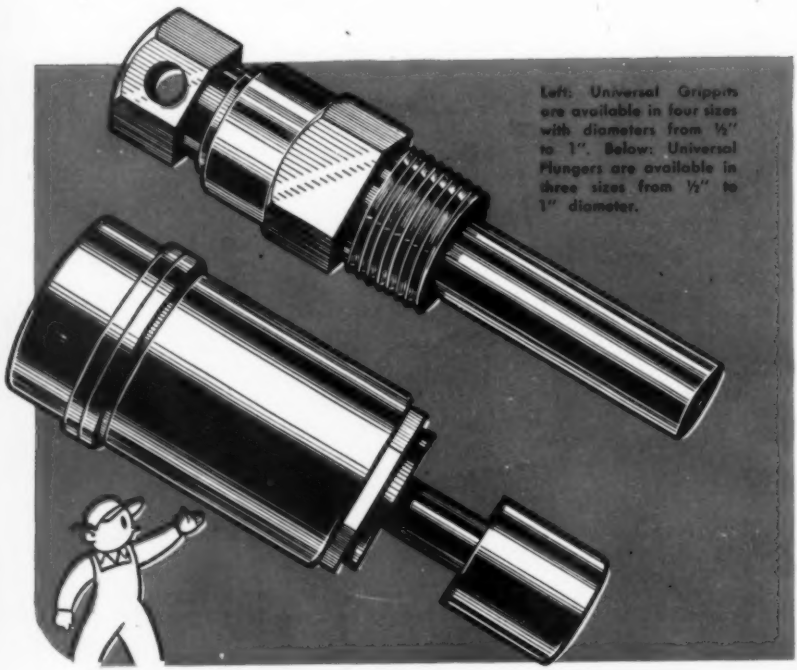


# *Severance*

MIDGET MILLING CUTTERS • PRECISION REGRINDING  
Severance Tool Industries Inc., Saginaw, Michigan • Plants In Long Island City, New York;  
Detroit 2, Michigan; Fort Wayne, Indiana; Chicago 6, Illinois, and Los Angeles 21, California.  
In Canada: 60 Front Street West, Toronto, Ontario.

## New Universal Grippits and Plungers Speed Production, Increase Accuracy

Universal Grippits reduce time-wasting delays in set-up operations because, inserted through a tapped hole in the jig or fixture, they clamp the work quickly and securely with only one eighth turn. Universal Plungers for multi-stationed tools are standardized in three sizes, ready to be installed at approximately one-fourth the cost of special-made plungers. Both Universal Grippits and Plungers cut production costs, and both are made with the same care and exacting accuracy as are the drill bushings, collet chucks, and other fine Universal products. Write for full information on any of the Universal tools illustrated here.

The illustration shows two types of machine tool accessories. The top tool, a Universal Grippit, has a hexagonal base with a central hole, a threaded section, and a long cylindrical shaft. The bottom tool, a Universal Plunger, consists of a large cylindrical body with a smaller cylindrical cap at the bottom. Both tools are shown in a perspective view against a dark background.

Left: Universal Grippits are available in four sizes with diameters from  $\frac{1}{8}$ " to 1". Below: Universal Plungers are available in three sizes from  $\frac{1}{8}$ " to 1" diameter.

UNIVERSAL TOOLS THAT WILL INCREASE PRODUCTION AND ACCURACY IN YOUR PLANT



Standard  
Drill Bushing



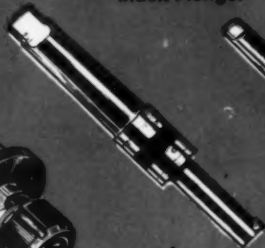
Index Plunger



Grippit



Collet Chuck with  
N.M.M. Shank



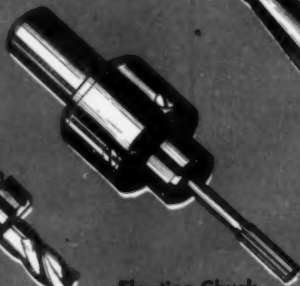
Mikro-lok  
Boring Bar



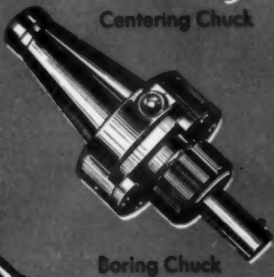
Centering Chuck



Standard  
Collet Chuck



Floating Chuck



Boring Chuck



**UNIVERSAL ENGINEERING COMPANY**

FRANKENMUTH, MICHIGAN Fighter Plane Given by Employees Employee Bond Deductions

# QUALITY DIAMONDS

## FOR DEFENSE

We can supply you with EASTERN Quality Diamonds, known for their dependability, at the following attractive PRICES:



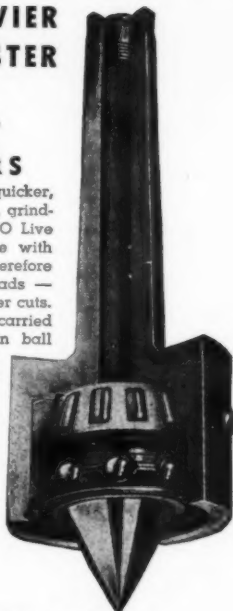
1/4 c't	.....\$ 2.95
1/2 "	..... 3.95
3/4 "	..... 7.00
1 "	..... 8.95
2 "	..... 15.00
3 "	..... 25.00
4 "	..... 35.00

These Diamonds can be supplied in any special holder or nib at the same price.

# TURN HEAVIER LOADS FASTER

## with IDEAL LIVE CENTERS

Get more work, quicker, out of lathes, millers, grinders, etc., with ETSCO Live Centers. They rotate with the work, and therefore permit heavier loads — faster speed — deeper cuts. The radial load is carried by a high precision ball bearing and thrust load absorbed by a taper roller bearing. All parts are hardened and ground.



## TRIPLE DUTY



Three interchangeable center pieces (illustrated above) for all kinds of centered and uncentered work. Saves set-up time. Extra charge.

Center No.	Morse Taper No.	Cap. 100 r.p.m. Rad. & Thrust	Net Price
1—MA	1	250 lbs.	\$20.00
2—MA	2	250 lbs.	20.00
3—MA	3	250 lbs.	20.00
3—MB	3	400 lbs.	25.00
4—MB	4	400 lbs.	25.00
4—MC	4	600 lbs.	35.00
5—MC	5	600 lbs.	35.00
1 1/4—SC	Straight	600 lbs.	35.00
1 3/4—SC	Straight	600 lbs.	35.00

# EASTERN

## Tool & Supply Co.

176 GRAND ST., NEW YORK 13, N. Y.

*Tools of Distinction*

We have in stock a complete line of Milling Cutters, Lathe Tools, H. S. Drills, H. S. & C. S. Taps and Dies, Lathe Chucks, Drill Chucks, Files, Special Taps and Dies.

**SEND FOR OUR CATALOGUE**

formerly called

**Atlas**

arbor presses

## DAKE ARBOR PRESSES



### DAKE PRODUCTION PRESSES



### DAKE HYDRAULIC PRESSES



### DAKE STRAIGHTENING PRESSES



### What every machinery buyer should know about Arbor Presses

When you order another arbor press, don't forget that Atlas presses are now made and sold as Dake presses by the Dake Engine Company.

Dake arbor presses are built to the old Atlas specifications. The lever presses have the original Atlas square ram which reduces friction and prolongs press life. The Atlas standard of quality in workmanship and material is maintained in all Dake presses. There is no change except in name.

Dake simple lever presses, in 7 models, are available up to 7 tons; the compound lever presses go up to 25 tons; and the hydraulic presses are rated up to 70 tons. In addition, the Dake line includes several straightening and other special presses. Write for complete Dake catalog.

Dake Engine Company  
626 Seventh Street, Grand Haven, Mich.

**DAKE ...**

*Now trade name for the old  
Atlas line of arbor presses*

# DAKE ARBOR PRESSES

*Maintain  
Hi Production  
Schedules*

with **"GETCO"**

**Precision Carbide  
and Hi-Speed  
CUTTING TOOLS**



Send Us Your Drawings  
or Specifications For  
Prompt Quotations on  
Special Tools.



**GETCO TOOL COMPANY**

**CARBIDE**

**SPECIAL CUTTING TOOLS**

**HI-SPEED**

15541 PLYMOUTH RD.,

DETROIT 27, MICH.

VERMONT 7-1770

## Manager and Machinist

*Agree...*



## It's AXELSON LATHES for the tough jobs!

Men who operate Axelson Heavy Duty Lathes know that these machine tools are "tops" in performance. Ease of operation, versatility and accurate action—on the heaviest roughing cut or the finest precision work—has won the approval of every machinist from the old-timer down to the newest hand.

Production managers too, who must watch per-piece cost and avoid rejects, know that Axelson Lathes merit complete confidence. Built-in quality and reliability

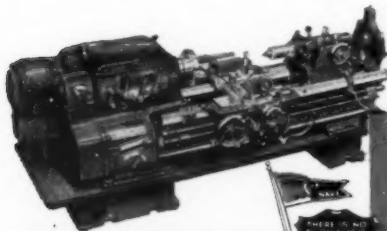
are demonstrated by hundreds of plant operators who have specified Axelson Lathes for years, and who are still coming back for more.

Thirty years of dependable machine tool building experience have made Axelson Lathes the leader in smooth, fast accuracy on any turning job.

Learn how Axelson Lathes can *up* production for you. Write for Bulletin 4401 today.

**AXELSON MANUFACTURING COMPANY**  
6160 S. Boyle Ave. (P.O. Box 98, Vernon Station), Los Angeles  
11, Calif. • 50 Church St., New York City 7 • 3844 Walsh St.,  
St. Louis 16, Mo.

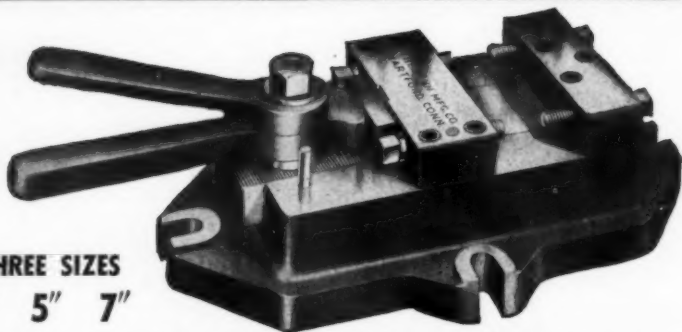
**BUY WAR BONDS!**



AXELSON LATHES, of various lengths, are manufactured in 14, 16, 18, 20 and 22-inch sizes.

**AXELSON LATHES**  
*Dependable for over a Quarter Century*

# NOW NATIONALLY DISTRIBUTED THROUGH LEADING SUPPLY HOUSES



THREE SIZES  
4" 5" 7"

## FENN QUICK-ACTION VISE

A partial list of suppliers who are prepared to give you special service. If your territory is not listed write direct.

Dillon Supply Company  
Raleigh, North Carolina  
The Globe Machinery & Supply Co.  
Des Moines, Iowa  
The Hardware & Supply Company  
Akron, Ohio  
The Jennison Hardware Company  
Bay City, Michigan  
Kasper & Koetzle, Inc.  
Brooklyn 6, New York  
Lafayette Tool & Supply Company  
New York 13, N. Y.  
Langdon Supply Company  
Kansas City 7, Missouri  
Lewis Supply Company  
Memphis, Tennessee  
The C. S. Mersick & Company  
New Haven 7, Conn.  
Mill & Factory Supply Co.  
Toledo, Ohio  
C. T. Patterson Company, Inc.  
New Orleans 7, Louisiana

Peden Iron & Steel Company  
Houston 1, Texas  
Henry A. Petter Supply Company  
Paducah, Kentucky  
Root, Neal & Company  
Buffalo, New York  
The South Bend Supply Company  
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Strong, Carlisle & Hammond Co.  
Cleveland 13, Ohio  
Theo. C. Ulmer, Inc.  
Philadelphia 25, Pennsylvania  
The Vonnegut Hardware Company  
Indianapolis 9, Indiana  
The Henry Walke Company  
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### CANADA

Northwest Industries Limited  
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Montreal - Toronto - Windsor

## THE FENN MANUFACTURING CO. HARTFORD, CONNECTICUT



# A Shifting Problem?

Consult a . .

## SPECIALIST

IN

GEAR TOOTH FORMING

GEAR TOOTH GRAMPERING

CLUTCH TOOTH MILLING

GROUND FORM RELIEVED

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117 E. Hazelhurst, Ferndale 20, Michigan  
Rush me a free copy of your new illustrated  
circular on gear shifting problems and gear  
tooth pointers.

Name.....

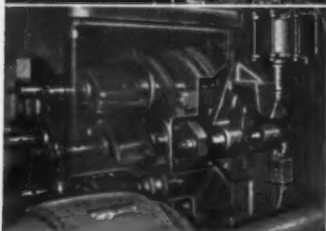
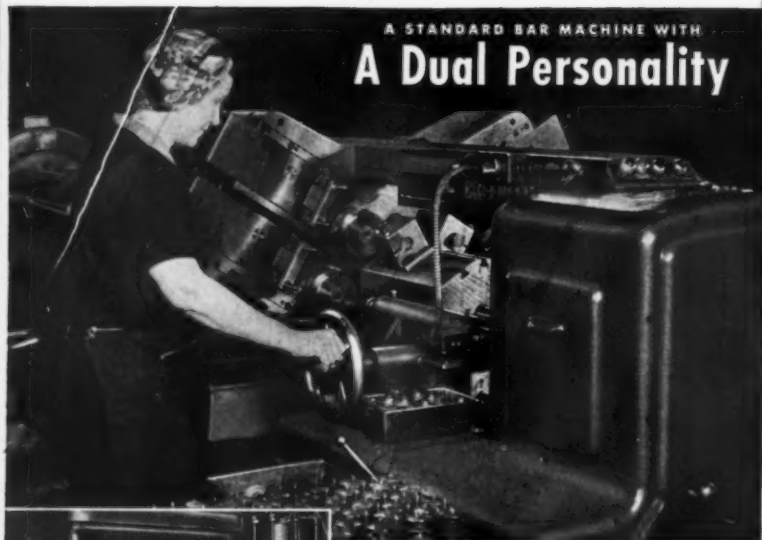
Title.....

Firm.....

(Attach to your letterhead and mail)

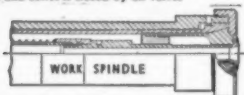
A STANDARD BAR MACHINE WITH

## A Dual Personality



### AIR OPERATED COLLET MECHANISM

View shows air cylinder and collet operating mechanism used on Greenlee Six with hand chucking equipment. Parts are loaded while machine is in feed stroke. Safety stops prevent indexing until chucking operation is completed and collet is closed by air valve.



### PARTS ARE EJECTED AUTOMATICALLY

By means of the hand operated chucking spindle, the work piece is loaded into the work spindle at No. 2 position against the tension of the spring loaded ejector. Piece is processed quickly at five stations. When completed, operator opens collet and piece is ejected. Coolant passes through spindles and clears chips.

### CHUCKING EQUIPMENT ARRANGED FOR QUICK CONVERSION ON A GREENLEE SIX-SPINDLE AUTOMATIC

Yesterday, this machine was set up as a standard 6-spindle automatic and capably produced thousands of precision parts from bar stock. But, today, it's a *Chucker*, and its six spindles are humming a production tune on secondary operations. Overnight, between sunset and sunrise, it was converted to meet the ever changing requirements of war.

It is this kind of versatility that helps keep Greenlee Automatics in the production picture day in and day out. It is their quick change-over features that facilitate fast handling of an unusual variety of both short and long run jobs. They are designed to handle a wide range of requirements for the job shop and the mass producer alike. Yes, in more ways than one, the Greenlee has a "dual personality".

If you haven't checked up lately on the Greenlee Six, it'll pay you to do so today. Write for more facts.



**GREENLEE BROS. & CO.**  
1832 MASON AVE., ROCKFORD, ILLINOIS



# GREENLEE

MULTI-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

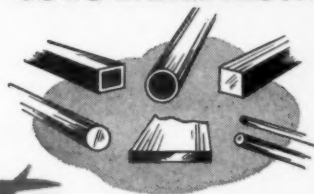


*Wells  
No. 8*

**SPECIFICATIONS  
WELLS No. 8**

CAPACITY: Rectangular, 8"x16"  
(Special Guides) . . 5" x 24"  
ROUNDS: . . . 8" diameter  
MOTOR: . . . 1/2 H. P., current optional  
SPEEDS: : Selective 60, 90, 130 feet per minute  
WEIGHT: . . . Approximately 750 pounds

**CUTS METALS...**



**CUTS *Costs* TOO!**

There's no doubt about it. For economical metal cutting, this Wells No. 8 is hard to beat. Because of its flexibility you can use it for your odd cutting jobs and free large production units for other work.

It cuts quickly, and with a minimum of labor. The quick acting vise handles odd shapes without special fixtures. It's accurate. And, it affords a substantial material

saving as the saw removes only 45 thousandths of an inch of material.

Another reason why the Wells cuts costs is its portability. You save time and labor by moving the saw to the work.

Thousands of Wells Metal Cutting Band Saws are working in busy plants. Check up. You'll find a spot in your plant for a Wells No. 8.

**WELLS CUTS**  
THE WAY OF METALS

**Wells**

*Products by Wells are Practical*  
**METAL CUTTING  
BAND SAWS**

WELLS MANUFACTURING CORPORATION  
707 COOLIDGE AVE., THREE RIVERS, MICHIGAN

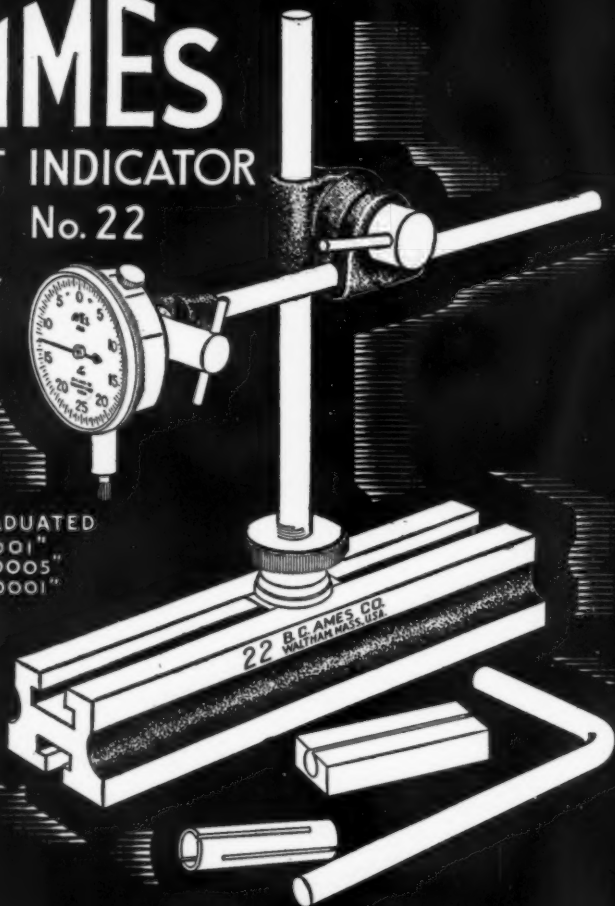
# AMES

## TEST INDICATOR

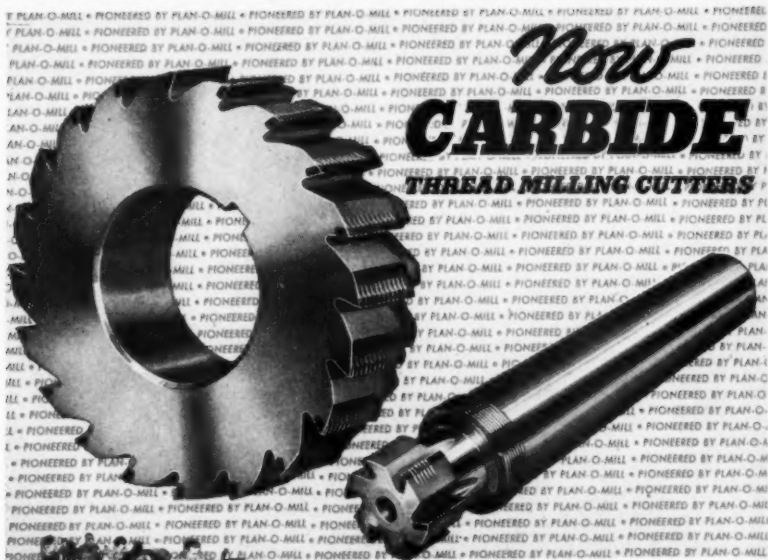
### No. 22

GRADUATED

.001"  
.0005"  
.0001"



B. C. AMES CO. WALTHAM, MASS., U.S.A.



# Now CARBIDE THREAD MILLING CUTTERS

5

## FIRSTS BY PLAN-O-MILL

- First to install General Electric's remarkable new Thy-mo-trol electronic feed control!
- First planetary to mill external threads with standard multiple thread cutter!
- First planetary to coordinate feeds and speeds!
- First to provide absolute control of feed-in!
- First to offer a practical, low cost carbide thread milling cutter!

Attractive deliveries can be made on Plan-co High-Speed Steel Thread and Form Milling Cutters.

Now, to the proven speed and accuracy of thread milling, Plan-O-Mill brings you the proven extra advantage of cemented carbide. This tough, wear resistant material, forming the cutting edges of Planco Carbide Thread Milling Cutters, gives you greater accuracy, greater speed, and many more parts per grind. No tooling change is necessary.

Planco Carbide Thread Milling Cutters are available in National, Whitworth, Acme, V, and special forms, with or without provision for the Higbee cut. Both shank and shell type cutters are offered.

For increased production with maximum savings in time, money, and manpower—tool up today with Planco Carbide Thread Milling Cutters!

### PLAN-O-MILL CORPORATION

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HAZEL PARK, MICH.

THREAD AND FORM  
MILLING MACHINES

THREAD AND FORM  
MILLING CUTTERS

# Why HANSEN

COUPLINGS  
ARE SO  
WIDELY USED

THEY'RE EASIER TO HANDLE, FASTER, LONGER LIFE,  
SPEED UP PRODUCTION... CUT DOWN COSTS

Hansen Couplings are first choice in all types and sizes of plants throughout the world because of their remarkable performance under every conceivable condition. • Simplicity in design means faster and easier operation, greater production, less cost, less trouble, longer life. • Simplicity in operation is one Hansen feature that saves time, a lot of time. For instance, with a Hansen Air Coupling you merely push plug into socket, it is connected, locked and air is automatically turned on. To disconnect, merely slide sleeve back, it is unlocked, disconnected and air is automatically turned off. There's a Hansen Coupling made for air, oil, grease, gasoline, oxygen and acetylene. Send in for free industrial catalog.

**THE HANSEN MFG. CO.**

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# HIGH PRAISE from One of America's Biggest War Plants!

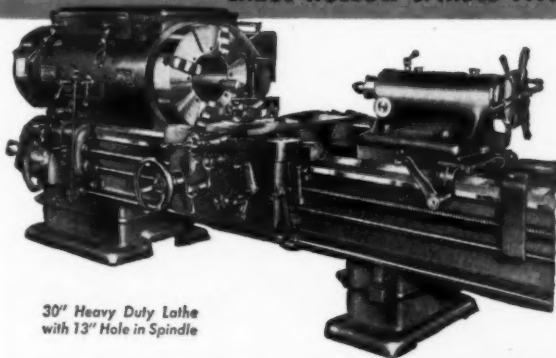


"HYDRATROL LATHES have been very satisfactory over a very intensive 3-shift operation for a long time. They have saved us many man hours."

*(From letter to our files)*

## HYDRATROL LATHES

LARGE HOLLOW SPINDLE TYPE



30" Heavy Duty Lathe  
with 13" Hole in Spindle

### 5 sizes-18" to 36"

Small, 18" up to 7-1/4" Hole

Medium, 24" up to 12" Hole

Large, 27" up to 13" Hole

Large, 30" up to 14" Hole

Large, 36" up to 16-1/2" Hole

(Standard Type)  
lathes, 16" to 36"

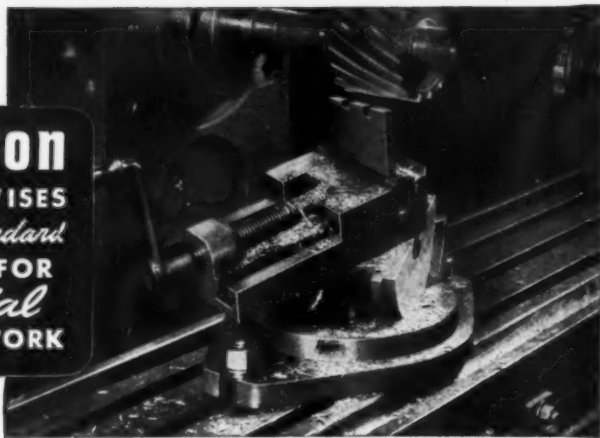
In hundreds of plants — under all sorts of conditions — HYDRATROL LATHES (Large Hollow Spindle Type), are doing a better job than had ever been done before. Invariably they are increasing production, improving work, cutting costs.

The chances are that YOU can "do it better" on a HYDRATROL LATHE. Why not send us prints of your difficult, unusual or too-costly machining jobs, for a specific, time-and-money-saving recommendation.

**Lehmann**  
**MACHINE COMPANY**

CHOUTEAU AT GRAND  
SAINT LOUIS 3, MISSOURI

**WESSON**  
**ANGLE VISES**  
 USE *Standard*  
**TOOLS FOR**  
*Special*  
**ANGLE WORK**



**FOR LOWER COSTS NOW—FOR RECONVERSION LATER**

These are high precision, top quality, 3-way angle vise that can be relied upon to slash set-up time on difficult compound angle machining with standard machine tools. Save many man-hours . . . quickly liquidate the vise cost . . . assure uniform angle accuracy in toolroom or production duty.

**ORDER NOW—*Multiply* THE USEFULNESS  
 OF YOUR *Standard* MACHINE TOOLS**

Standard machines can be transformed instantly into "special" angle machines with WESSON Vises . . . for precision angle milling, drilling, grinding, tool sharpening and many other difficult angle machining jobs. You can remove vise without altering set-up. Buy several — use them in series on many machines . . . save time and money . . . boost production!



**WESSON**  
*Universal* **VISES**  
 BUILT TO WESSON STANDARDS OF  
 QUALITY AND PRECISION

**WESSON PRODUCTS CO.**

Dept. MT-2, 710 Fisher Bldg.  
 Detroit 2, Michigan

Please send me illustrated  
 bulletin of WESSON Universal  
 VISES and ANGLE PLATES.

Name and Title

Firm Name

Address

City

State



# THE DIE-SINKER WHO

*wasn't  
satisfied*



Fully 30 years ago, he decided there must be some less tedious way to "clean up" his dies . . . to get the hard, sharp contours true to the blue-print design. So he himself invented the way—and the hand-cut rotary file thus arrived to substitute quick precision for tiresome drudgery.

His experience then—and through

the score of subsequent years devoted to rotary file pioneering—is all part of RFC history. Many hundreds of industrial plants have profited by this experience . . . and today recognize RFC HAND-CUT ROTARY FILE accuracy and speed as genuine factors in promoting War plant and essential civilian-use production.

How can RFC rotary files help you? A discussion may uncover applications—and important benefits—that may surprise you. Or, write for the RFC catalog.



# PART NUMBERS

LETTERING

GRADUATIONS

ROLLED

BY MACHINE

ON

FLAT & ROUND SURFACES

**Sure - Fast - Accurate**

OBSOLETES HAND STAMPING

SAVES { PARTS  
LABOR  
STAMPS

**Eliminates** POOR MARKING  
ERROR — NOISE

**Speeds . . DELIVERIES**

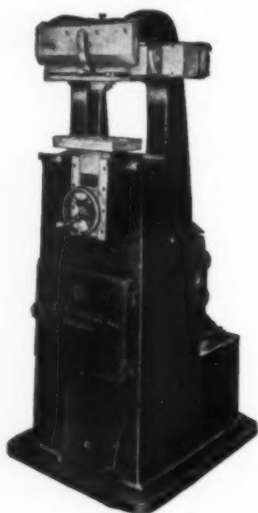
## ALSO ADAPTED TO CERTAIN KNURLING OPERATIONS

This Hydraulic Machine will mark piece parts quickly and accurately. It is serving in the war effort in many plants for marking components of guns, tanks, planes, motors, engines, shells, and practically every metal part produced for war equipment. Machine will mark unlimited number of sizes and shapes when equipped with proper tools and fixtures. It will also do an excellent knurling job on solids and shells of small diameters.

*Designed and Built By*

**GEO. T. SCHMIDT, INC.**

1802 BELLE PLAINE AVENUE CHICAGO 13, ILLINOIS



MODEL 175

## THE CONE AUTOMATIC MACHINE COMPANY



sees many

# GOOD THINGS AHEAD

**It is reported that . . . . .**

Through recent explorations our known reserves of bauxite (source of aluminum) have been increased by more than 100 million tons. *Science News Letter.*

get ready with CONE for tomorrow

The National Postwar Products Exposition is scheduled to open March first at the Chicago Coliseum. *Marcus W. Hinson, Ex. Mgr. 1513 S. Wabash Ave., Chicago 5.*

get ready with CONE for tomorrow

A new tractor-drawn farm implement plows, discs and harrows in one operation. "Till-Master", Till-Master Mfg. Co., Portland, Oregon.

get ready with CONE for tomorrow

Today's scientists have revived a four-thousand year old method of killing insect pests with fine dusts. These dusts adhere to the insect's skin or casing and interfere with its water balance. Death results from thirst. *Dr. H. V. A. Briecoe, Imperial College, London.*

get ready with CONE for tomorrow

A railroad now has one-hundred plywood box cars and one thousand on order. The weight saving is said to be about two tons per car. *Great Northern Railway.*

get ready with CONE for tomorrow

A new "de-barker" is being used in some pulp mills that removes the bark from logs by the force of a jet of water at 650 pounds pressure without removing any wood. The saving in wood is said to be as high as 20%. *Scientific American, Oct. 1944.*

get ready with CONE for tomorrow

The continuous injection molding of plastics is made possible by a new machine. *Chrysler Corp.*

get ready with CONE for tomorrow

A new electric iron requires no cord but absorbs heat from an electrically heated and thermostatically controlled base. *Eureka Vacuum Cleaner Co., Detroit.*

Jet propulsion may be used to power sailplanes and gliders and, in miniature, for flying models. *McGraw-Hill Overseas Digest.*

get ready with CONE for tomorrow

A university engineer has announced the discovery of a new type of concrete, useful for building construction, that is stronger than steel and lighter than aluminum. *Northwestern University.*

get ready with CONE for tomorrow

A new \$1,800, four-room house will come directly off the assembly line on to a truck for delivery. "Wing-foot Homes", Goodyear Tire and Rubber Co.

get ready with CONE for tomorrow

A "zipper" fastening has been developed that is claimed to seal in liquids and gases. *B. F. Goodrich Co.*

It has been stated that the weight of aircraft engines has been reduced about 40% since the beginning of the war. *Aircraft Yearbook 1944.*

get ready with CONE for tomorrow

Manufacturers of the "jeep" plan to sell it to farmers and are reported to have ordered 25,000 bodies for this purpose. *Willys Overland.*

get ready with CONE for tomorrow

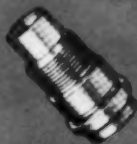
A machine has been patented for making barrels out of cardboard for packing butter, flour, sugar, chemicals, fruits, or small parts. *Everett Industries, Akron.*

get ready with CONE for tomorrow

Aviation and electrical engineers are collaborating on an electric drive for aircraft. This will, if practical, permit the location of engines in the fuselage and do away with nacelles in the wings. *Hughes Aircraft Co. and Westinghouse.*

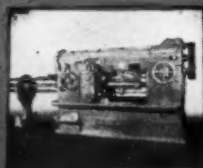
get ready with CONE for tomorrow

One of the country's largest grocery chains is planning to ship fresh fruits and vegetables to its markets by airplane. *A & P.*



**Here is performance  
that is definitely  
AHEAD**

**This part calls for extreme accuracy and yet requires wide forming cuts on a variety of diameters. In one position an attachment taps an inside thread 5/16"-18 while, at the same time, a die cuts an outside thread 5/8"-27. Produced on the 6 Spindle Conomatic at the rate of 12.5 seconds per part.**



# CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.



# Curtis

## SETS THE STANDARD

The "Quality" demanded by Curtis Universal Joint "Standards" gives every user of Curtis Joints a product that meets and surpasses rigid and strenuous wartime needs.

Each part shown has special features—successfully proven in hundreds of applications by airplane and machine tool industries.

Twenty years of experience selecting the right steels, special heat treatments developed by Curtis, careful machining to close tolerances, finished ground surfaces all accurately fitted to give positive, free articulation, are incorporated into each part.

**Figs. 1 & 2 FORKS** — heat treated to secure maximum toughness and strength, inside ear surfaces accurately ground for close, smooth working operation, pin holes broached and honed for perfect alignment, the O. D. cylindrically ground for concentricity.

**Fig. 3 CENTER BLOCK** — holes intersecting accurately in the center, with the faces parallel, hardened and precision ground for long wear, with recess for the Telltale Lock ring.

**Figs. 4 & 5 PINS** — hardened and centerless ground to close tolerances reduce radial play.

**Fig. 6 OILER** — Curtis pioneered proper and essential lubrication, and made it easy by furnishing patented oilers in the large pin.

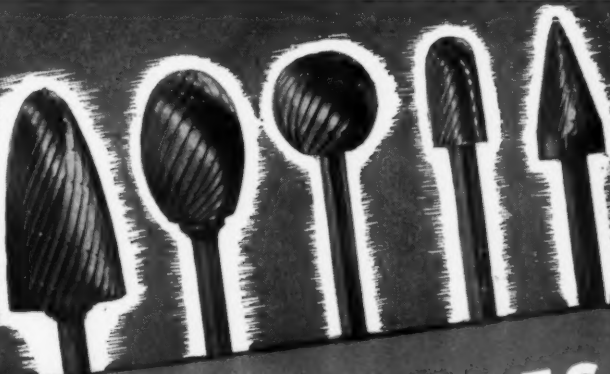
**Fig. 7 "TELLTALE" LOCK RING** — patented by Curtis — snaps into small pin groove and fits recess of center block. This insures firm, positive lock-up of entire assembly — makes disassembly and reassembly quick and easy, and the "Telltale" end shows at a glance that the ring is in proper locking position.

*Curtis Engineers can help solve your universal joint problems. Our experience and knowledge is yours for the asking.*



# CURTIS UNIVERSAL JOINT CO. INC.

SPRINGFIELD, MASS. • BOSTON GEAR WORKS, NO. QUINCY, MASS., SOLE DISTRIBUTORS



# ROTARY FILES

BOTH GROUND-FROM-SOLID CUTTERS AND HAND-CUT TYPES

to speed up your metal-cutting jobs

**D**ESIGNED FOR USE on flexible or stationary shafts, filing machines, portable electric and air tools and similar devices, Heller Rotary Files are high-speed production tools. They meet your needs for the faster cutting of metals, plastics and other materials.

The shapes obtainable satisfy every requirement. They range from cylindrical with flat or radius ends, spherical, elliptical and tree shapes to conical, flame, reverse-angle, semi-spherical convex,

concave and other designs. Three cuts,—coarse, medium and fine.

Tell us your particular rotary file problem. Our engineers will be glad to cooperate in helping you solve it.

## HELLER BROTHERS COMPANY

*America's Oldest File Manufacturers  
Good Tools Since 1836*

Newark 4. N.J. • Newcomerstown, Ohio



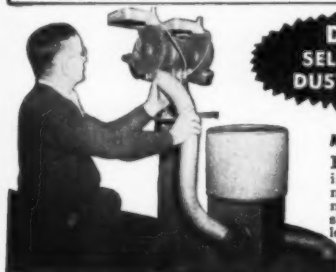
*Awarded to the  
Newcomerstown,  
Ohio, Plant*

# HELLER FILES

NUCUT "WAVY-TEETH" • VIXEN CURVED-TOOTH • SWISS PATTERN • ROTARY



# Quick way to STOP DUST!



## DUSTKOP SELF-CONTAINED DUST COLLECTORS

### MODEL 600

DUSTKOPS are installed in a few minutes. Flexible metal hose makes slip fit with dust outlets on grinder.

### MODEL 950

This unit, with dust hoods, "ready to go," fits any double-end pedestal grinder not already equipped with wheel guards and dust outlets.

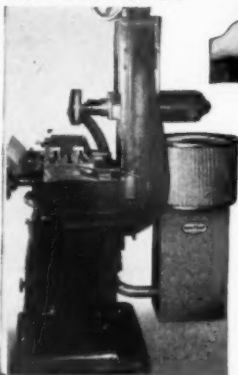


## DUST STOPPED ON ALL ABRASIVE OPERATIONS AT LOWEST COST

For quick, economical, effective dust control at the source, install DUSTKOPS. Easy to attach to surface grinders, disc grinders, cutter and tool grinders, flexible shaft grinders—or to buffers, sanders and abrasive cut-offs—whether single or multiple units. Large or small models available.

DUSTKOPS are compact and portable. Entirely self contained, with motor, fan, cyclone separator (in all but smallest models) and spun glass filter. Flexible metal hose permits quick installation.

DUSTKOPS clean the dust-laden air without wasting heat. Efficient cyclone separator provides low maintenance. Many other features make DUSTKOPS ideal for your shop or laboratory. Immediate shipment of "standard" voltage units.



### MODEL 600

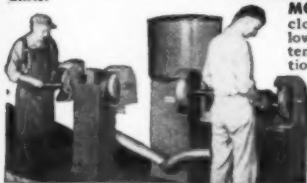
With flat, spun glass filter for compact bench installation. Pulls all dust from two grinder wheels.



**MODEL 950**—has cyclone separator, plus spun glass filter. For medium duty work of all kinds.



**MODEL 1250**—gets all dust and smoke from this heavy duty abrasive cut-off, at extremely low cost.



**MODEL 950**—with cyclone separator means low first cost, low maintenance, even on production surface grinder.

(Left)

**MODEL 1250**—one unit handles dust from four wheels.

Write  
NOW  
for Bulletins

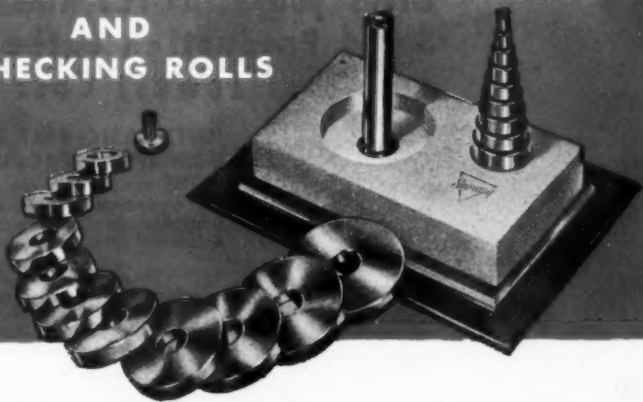
## AGET-DETROIT COMPANY

605 First National Building • Ann Arbor, Michigan

Detroit Office: Tel. CADillac 309C

# *New Micrometer Accuracy*

**WITH SAV-WAY MASTER SETTING  
AND  
CHECKING ROLLS**



## **Every Mechanic Needs This Set**

Every production man knows that precision tools and inspection devices are only as accurate as the methods and gages by which they are checked and set. When anvils are worn unevenly, flat gage blocks may not be adequate. This Sav-Way set of Master Setting and Checking Rolls provides for the first time a really accurate means of checking micrometers, and other types of gages under all conditions of wear. The set consists of 20 rolls, ranging from .100" to 2.000" diameter. Rolls are hardened, ground, and lapped to X gage tolerance. The set is housed in a modern, transparent, plastic case.



A new micrometer instruction book full of valuable technical information will accompany each set.

**CLIP THIS COUPON TO YOUR LETTERHEAD**

**SAV-WAY INDUSTRIES**

Box 117, Harper Sta., Detroit 13, Mich.

Please send me illustrated literature on the Master Setting and Checking Rolls.

Name

Street and No.

City

State

**Sav-Way INDUSTRIES**  
*Products Division*

BOX 117, HARPER STATION, DETROIT 13, MICHIGAN

# "BASIC UNIT+PARTS" PLAN

Gives you **EXACTLY** the High Speed Production Lathe you need — at **Lowest Cost**



(LEFT) **BASIC UNIT OF THE MINNEAPOLIS PRODUCTION LATHE** to which you can add only the equipment needed for your particular production "set-up". 4 different drives.



Special set-up speeds up brake band production.

## (RIGHT) A SET-UP "TAILOR-MADE" FOR CUSTOMER'S NEEDS

A delivery bottle neck was broken by machining 3 brake band segments at a time with this special arrangement of Minneapolis Production Lathe. Special face-plate holds 3 segments. Counterbalanced loading fixture mounted on carriage is swung back for refill while lathe is operating.

## SMALLER INVESTMENT — Lower Production Costs

The "MINNEAPOLIS" Production Lathe is extremely adaptable to any production set-up, particularly second operation work. Its simplified design and ease of control enable inexperienced operators to turn out high speed volume production.

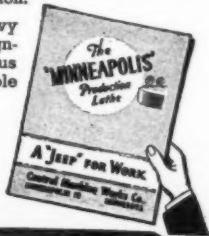
The "MINNEAPOLIS" has 2 1/4" collet capacity, 14" swing, heavy duty spindle assembly. It is backed by more than 50 years designing and manufacturing experience. Send for literature — write us your production problems. Send sample part or drawing if possible — let us quote you on a "tailor-made" lathe for your work.

## CENTRAL MACHINE WORKS CO.

Machinery designers and manufacturers since 1890

1226<sup>1</sup> Central Avenue,

Minneapolis 13, Minnesota





FORMERLY  
Universal electric  
drills. Weighed  
over 60 lbs. Speed  
dropped 45%  
under load.

**30 LB.  
VITAMIN PILL**

... half the weight  
twice the output

**RIGHT TOOL**

**One of the best tonics for portable tool output is to conserve the energy of the man who does the work.**

"Amen," says this structural shop. They were using universal electric drills for reaming  $1\frac{3}{8}$ " holes in channels and 30-inch I-beam flanges. The tools weighed more than 60 lbs. and had a 45% speed drop under load.

Imagine how the Rotor Application Engineer pleased the men on this job (and the boss too) when he got these results with Rotor E-73 Air Drills:

**Easier operation** . . . less fatigue because of reduction of about 30 lbs. in tool weight.

**Doubled output** . . . because of greater power and much higher sustained reaming speed under load.

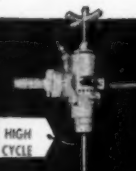
Find out how the Rotor Application Engineer can put more zip into *your* portable tool operations.

Yours for the *right tool*,

**AIR O'TOOL**



**THE ROTOR TOOL CO.**  
CLEVELAND OHIO



MEMBER ANALYSIS OF PORTABLE TOOL PROBLEMS

# husky accurate

## *A New Low-Cost 18" Drill Press That Can Really Take It*

This new Duro 18" Drill Press has been designed and built to handle a much heavier load continuously than ordinary low-priced units. Has many new features including: special design for quick-changing of belts; head casting slotted to provide take-up when wear develops from movement of quill; six-spline telescopic self-aligning spindle that reduces play; heavy ribbed cast iron table and base with large machined surface and grooves for collecting coolant; base provided with "T" slots for bolting jigs; improved simplified depth gauge. Efficient production foot feed available. Specifications include:  $\frac{3}{4}$ " capacity. No. 2 Morse Taper. 4 New Departure Ball Bearings. Speed range 425 to 2030 R.P.M. Spindle travel—5". Drills to center of 18" circle. Maximum distance from base to spindle—49". Maximum distance from table to spindle—19". Overall Height—68". Size of overall base—18" x 28½". Diameter of column—3½". Weight of Model A3088 (as illustrated) less motor, 350 lbs. Also available in bench model.



**Send for Catalog**—showing low-cost single and multi-spindle Drill Presses, Metal-Cutting Band Saws, Circular Saws, Jointers, Router, Shapers, Grinders, Lathes, Scroll Saws, Flexible Shaft Units, and Portable Electric Drills. Gives full specifications and prices.

*Available on Priorities Only*

# DURO TOOLS

## MACHINE TOOL DIVISION

DURO METAL PRODUCTS CO. 2699 N. KILDARE AVE. CHICAGO 39, ILL.

**ALSO MAKERS OF DURO HAND TOOLS**

# ONE LEVER.

provides complete control



Single lever hydraulic control of RACINE's Heavy Duty Metal Cutting Saws marks a new era in the efficiency of metal cutting machines. Gone are cams, weights, ratchets, levers and other outmoded methods of applying feed, lift and other operating functions. RACINE Machines are rugged in construction, and accurate, representing 36 years of constant research and improvement.

RACINE's complete line includes capacities from 6" x 6" to 20" x 20". Write for our complete Catalog No. 12. Also outline your metal cutting operations. Our engineers will supply definite recommendations without cost to you. Address RACINE TOOL AND MACHINE CO., 1754 State St., Racine, Wisconsin.

## comparison proves

- ★ Design based on machine tool standards — incorporates modern hydraulic principles.
- ★ Progressive feed — each tooth removes a long curled chip.
- ★ Insures capacity production in every shop.
- ★ Rugged construction — trouble-free operation — these machines stay at work.

## Racine Oil Hydraulic Pumps .. A Modern Source of Hydraulic Force

The flexibility of your hydraulic circuits can be increased with RACINE "Variable Volume" Pumps. Three sizes: 12, 20 and 30 G.P.M. Pressures 50 to 1000 lbs. P.S.I. Ask for our Catalog No. P-10-C. Give us a summary of your hydraulic problems.



# RACINE

# LET *Cadillac* STANDARDS PROTECT *Your* STANDARDS!

Precision and quality always have been primary considerations at Cadillac Gage Company. For Cadillac engineers realize that upon the precision of their workmanship and the quality of the gages they manufacture depend the quality of the work produced by Cadillac Gage customers.

Unsurpassed quality, painstaking workmanship and the highest standards of precision, however, are not the only reasons why production men in ever increasing numbers specify Cadillac for their thread gaging equipment. Cadillac's immense stock of over 10,000 gages in all standard sizes provides gages for immediate delivery—a time-saving and money-saving feature.

Next time you order thread plug or thread ring gages, specify Cadillac . . . and let Cadillac standards protect your high standards of manufacturing.



# *Cadillac*

## GAGE COMPANY

20316 HOOVER ROAD • DETROIT 5, MICH.

... 5 TO 20 TIMES  
THE WEAR WITH  
★ STELLITE ★

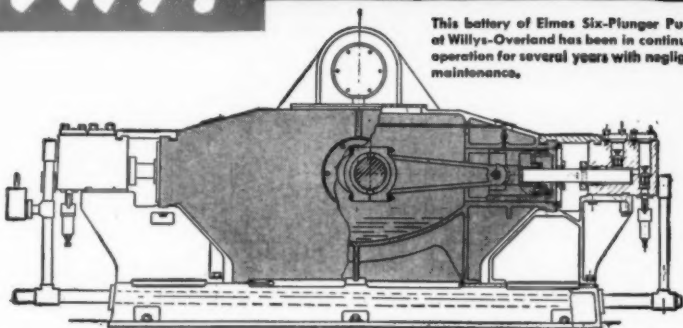
Have you a job that is really tough on gages? Try Cadillac STELLITE Thread Plug Gages! See for yourself that these gages will give 5 to 20 times the wear of regular steel gages.

# HIGH P.S.I.

# and WHY!



This battery of Elmes Six-Plunger Pumps at Willys-Overland has been in continuous operation for several years with negligible maintenance.



No job is too tough for this Elmes Six-Plunger Pump. Sizes range from 100 to 500 horsepower; pressures to 35,000 p.s.i. The rigid one-piece housing (shaded area on drawing) absorbs shocks and maintains alignment. Top efficiency, low maintenance, easy servicing have proved the value of rugged, accessible construction. Many of the novel design features are patented. Elmes builds the right pump for every operational need. Elmes Engineering Works of American Steel Foundries, 244 N. Morgan St., Chicago 7. Also manufactured in Canada.

## HERE'S THE "WHY"

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- 2—Counterbalanced Forged-Steel Crank Shaft.
- 3—Self-Aligning Thrust Block.
- 4—Floating Plunger.
- 5—Removable Valve Seats.
- 6—Forged-Steel Valve Body.
- 7—Anti-Friction Bearings Throughout.
- 8—Pressure Lubrication on Cross Heads and All Bearings.
- 9—Herringbone Gear Drive with pinion cut integrally on shaft.
- 10—Semi-Steel Sub-Base.
- 11—Crank Shaft Bearings both Splash and Pressure Lubricated.
- 12—Needle-Bearing Wrist Pins.
- 13—Piston-Type Cross Heads.
- 14—Adjustable Packing Glands.
- 15—Bronze-Lined Stuffing Boxes.

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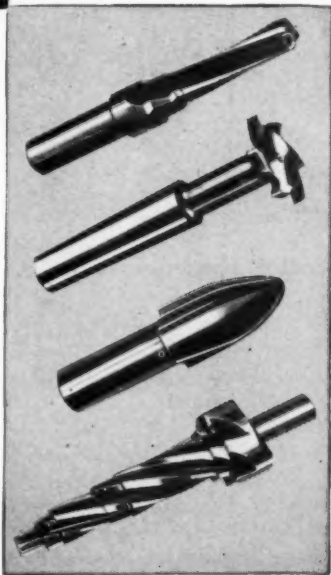
*"KINDA AWKWARD SHAVING?  
ISN'T IT BILL?"*

*"YES—BUT THIS A. C. E.  
CUTTING TOOL IS AS  
SHARP AS MY RAZOR."*

Bill may be a bit optimistic about his reamers, but the plain truth about A.C.E. Special Cutting tools is that their edges are both sharp and long wearing—they do a pile of cutting work before re-sharpening.

You can obtain A.C.E. Special Cutting tools in all types, both hi-speed and carbide tipped. Specials to blueprints only.

Send inquiries for prompt quotations—early deliveries—Bulletin 301 on request.



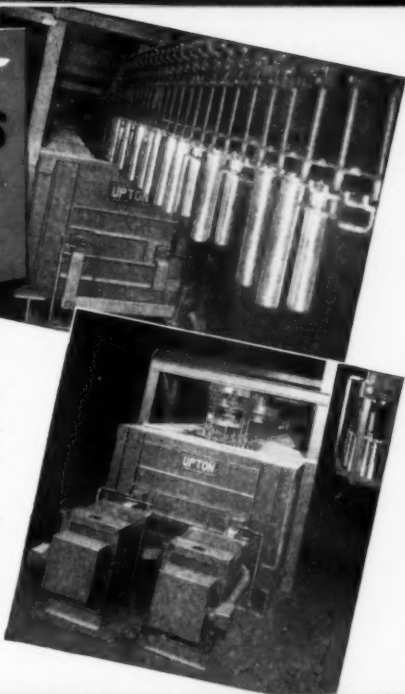
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Never before has it been possible to "full anneal" brass with such complete lack of oxidation that subsequent pickling is not required.

The Detroit producer of brass cartridge cases insists that these Upton Electric Salt Bath Furnaces "paid for themselves in the first three weeks of operation."



Ask us for complete information on this or any other difficult heat treating problem.

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**Sentry Model Y  
High Speed Steel Hardening Furnace**

**The Sentry Diamond  
Block Method of  
Atmospheric Control**  
for H. S. Steel Hardening  
when used with

## **Sentry Furnaces**

is economical.

Based on actual Customer  
Records, summarization of  
Total Operating Cost for Fur-  
nace and all Accessories exclu-  
sive of labor indicates a hard-  
ening cost for High Speed Steel  
of 1 cent per pound.

**That is ECONOMY!!!!  
And with economy goes  
QUALITY,**

**Sentry Quality**, your assurance  
of consistently hard tools, free  
from Scale or Decarburization.

Suitable for High Carbon High  
Chrome Steels as well as All  
Types of High Speed Steels in-  
terchangeably.

*Write for Bulletin 1020-6D  
Send Sample Tools for Demonstration.*



**The Sentry Company**  
**FOXBORO, MASS., U. S. A.**





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Complete Gaging System for*

## **CARTRIDGE CASE INSPECTION"**

● We are prepared to supply producers of ordnance material with gages of all sizes—from the largest to the smallest, either empty case or complete rounds.

Our STANDARD LIST PRICES include: 20 MM, 37 MM, 40 MM, 57 MM, 75 MM, 76 MM, 90 MM,

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The "QUALITY" Gaging System includes: (1) New Gages, (2) Gage Inspection Service and (3) Gage Reconditioning Service.

Your request for information about any detail of either service

or prices will be welcome and will receive our immediate attention.

*War Bonds... Your Best Buy!*

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*Manufacturers of "Quality" Products*

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... produce those FINE WORK FINISHES if your  
DIAMOND WHEELS are LUBRICATED with —

## **STADOIL DIAMOND LAPPING OIL**

Eliminates the loading and glazing of diamond wheels  
and adds much to wheel and tool life.

YOUR CARBIDE TOOL OR DIAMOND WHEEL MANU-  
FACTURER WILL ATTEST STADOIL VALUE TO YOU  
AND ITS WIDE USAGE.

**USED SINCE 1935** by thousands in the Motor Rebuild-  
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Available in many sizes to 50 gallon price basis.

Your Mill or Industrial Supply jobber has this for you —  
if not, then we welcome your inquiry direct.

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*Manufacturers Representatives . . . we have an unusual  
deal for you and some attractive territory open.*

# THE

# NEW CHAMPION



**We quote from a recent letter (unsolicited) from one of the largest aircraft engine plants in the country: (name on request).**

"3/8-16-4 flute bottoming tap for magnesium. This (Sossner) tap gave us a record run of 11,552 holes. I had the tap inspected before running. This finish is much higher than I find in the usual run of taps. And I believe that the success of the tap was largely due to this fact."

*Tell us about YOUR tapping requirements and let us recommend a specific SOSSNER tap for your needs.*

**Taps • Gages • Steel Stamps and Dies**

## SOSSNER

161 Grand Street, New York 13  
or 27 Broadway, Lynbrook, N. Y.

# STREAMLINE the SURFACES

# *Superfinish*

for LONG LIFE  
and SMOOTH OPERATION

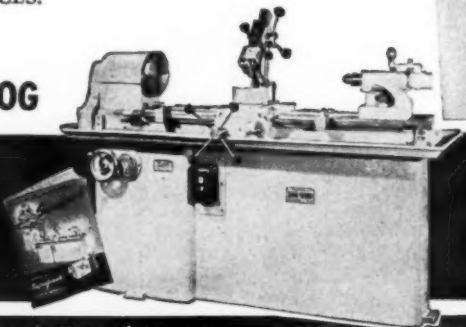
Bearings of all kinds . . . Clutch plate surfaces . . . Thrust surfaces . . . Punches and dies . . . Seals for water, air and oil pumps . . . Plug gages . . . Milling cutters . . . Reamers . . . Cutting tools . . . Tools of all kinds . . . Aircraft parts . . . Typewriter parts . . . Automotive parts, etc.

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SIX MODELS—FOR ALL TYPES OF WORK, including lathe attachments for EXTERNAL—INTERNAL—FLAT SURFACES.

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**It's  
FREE!**



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FOR THE ASKING**

***Mail Coupon at Once — The Supply Is Limited***

This new bread "slide rule" will save you time in determining all dimensions of AMERICAN STANDARD THREADS, PIPE THREADS and WOODRUFF KEYS, also gives decimal equivalents and other data.

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PRECISION GAGES • PRECISION MACHINED PARTS • PRECISION TOOLS

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FOR  
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9**

*and Accuracy*

**KEYWAY BROACHING**

**Adjustable-Expansion  
Push BROACH**

**MAINTAINS  $\pm .0005$  ACCURACY  
IN EVERY PIECE BROACHED**

Broaches slots of greatest accuracy to an average length of four inches and up to  $\frac{3}{8}$ " widths.

May be used on an Arbor Press, Lathe, Screw Machine and other standard equipment.

Has many valuable uses in shop and factory.

**10 TIMES FASTER THAN BY  
ORDINARY METHODS**

Actual tests in cutting keyways  $\frac{3}{16}$ " deep,  $\frac{3}{8}$ " wide,  $1\frac{1}{2}$ " I. D. 3" long, in a steel bushing proved ten times faster than by the handling of the same job on a shaper. Send for Bulletin 9. Learn more of this and similar operations. Get full information on the Broach.

**DEPT. A EAST SHORE MACHINE PRODUCTS CO.  
835 EAST 140TH STREET  
CLEVELAND 10, OHIO, U. S. A.**

*Glenny Broach in use  
on Arbor Press.*



*Glenny Broach in use on  
Turret Lathe in series with  
other operations.*



# THESE GAGES WERE NEEDED IN QUANTITY— AND THEY HAD TO BE RIGHT!!!!



The specification called for a tapered involute spline ring gage less than  $1/5$ " in diameter, with twelve teeth, evenly spaced and having an over-all accuracy that would permit full insertion of the master plug, without chatter or binding, at any tooth engagement. This is not an unusual order—we have others that are even more exacting—but we feel that it typifies the highly specialized engineering skill and fine workmanship that is integrated in all Vinco precision products. This exceptional ability to work consistently with microscopic dimensions and with such close accuracy is our assurance that if a gage can be built, Vinco can build it.

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OF HIGH SPEED STEEL

UNDERCUT TEETH

**Ample Chip Room.** The shearing action of the strong undercut teeth makes a more desirable cutter for production work, giving a smooth finish.

The form of tooth permits of repeated grinding, giving a much longer life.

## — DIMENSIONS — INCHES —

Diam-eter	Width Face	Size Hole	Price Each	Diam-eter	Width Face	Size Hole	Price Each
2	$\frac{3}{16}$	$\frac{1}{2}$	\$ 4.20	4	$\frac{3}{4}$	1	13.30
2	$\frac{1}{8}$	$\frac{3}{8}$	4.20	4	$\frac{3}{4}$	$1\frac{1}{4}$	13.30
2	$\frac{1}{4}$	$\frac{1}{2}$	4.40	4	$\frac{7}{8}$	1	14.30
2	$\frac{1}{4}$	$\frac{3}{8}$	4.40	4	$\frac{7}{8}$	$1\frac{1}{4}$	14.30
2	$\frac{3}{8}$	$\frac{1}{2}$	4.80	5	$\frac{1}{2}$	1	15.10
2	$\frac{3}{8}$	$\frac{3}{8}$	4.80	5	$\frac{1}{2}$	$1\frac{1}{4}$	15.10
2½	$\frac{1}{4}$	$\frac{3}{8}$	5.40	5	$\frac{3}{8}$	1	16.70
2½	$\frac{1}{8}$	$\frac{7}{8}$	5.70	5	$\frac{3}{8}$	$1\frac{1}{4}$	16.70
2½	$\frac{3}{8}$	$\frac{7}{8}$	6.00	5	$\frac{3}{4}$	1	18.20
2½	$\frac{1}{2}$	$\frac{7}{8}$	6.60	5	$\frac{3}{4}$	$1\frac{1}{4}$	18.20
3	$\frac{1}{4}$	1	6.50	5	1	$1\frac{1}{4}$	21.30
3	$\frac{1}{8}$	1	6.90	6	$\frac{1}{2}$	1	19.70
3	$\frac{3}{8}$	1	7.20	6	$\frac{1}{2}$	$1\frac{1}{4}$	19.70
3	$\frac{1}{2}$	1	7.60	6	$\frac{3}{8}$	$1\frac{1}{4}$	21.80
3	$\frac{1}{2}$	1	8.00	6	$\frac{3}{4}$	1	24.00
4	$\frac{1}{4}$	1	9.00	6	$\frac{3}{4}$	$1\frac{1}{4}$	24.00
4	$\frac{3}{8}$	1	10.10	6	1	$1\frac{1}{4}$	28.40
4	$\frac{1}{2}$	1	11.30	7	$\frac{3}{4}$	$1\frac{1}{4}$	34.40
4	$\frac{1}{2}$	$1\frac{1}{4}$	11.30	7	1	$1\frac{1}{4}$	40.30
4	$\frac{3}{8}$	1	12.30	8	$\frac{3}{4}$	$1\frac{1}{4}$	45.70
4	$\frac{3}{8}$	$1\frac{1}{4}$	12.30	8	1	$1\frac{1}{4}$	53.40

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# CENTER TOOL CO. *Machine Shop Equipment*

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We carry a complete line of H.S. Drills, Milling Cutters, Lathe Tools, H.S. & C.S. Taps & Dies, Drill Chucks, Lathe Chucks, Files, Special Taps & Dies



# ABRASIVE M-34 { NEW POWERFUL ACCURATE GRINDER

VERTICAL SPINDLE



Abrasive No. M34 Vertical Spindle Surface Grinder takes exceptionally heavy cuts with excellent finish. The powerful motorized spindle eliminates belting... provides more power at the cutting point and minimizes vibration.



Write for complete information and specifications in new Bulletin.

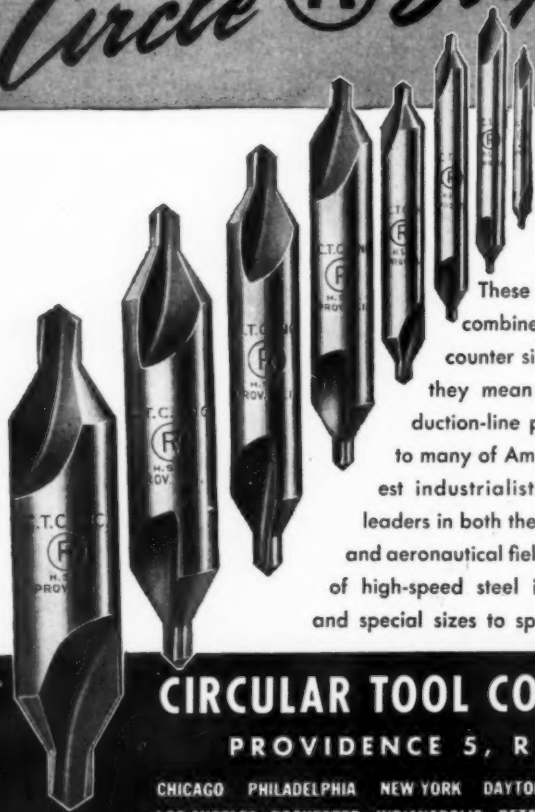
**ABRASIVE**  
ACCURACY BOOSTS PRODUCTION

ABRASIVE MACHINE TOOL COMPANY • EAST PROVIDENCE 14, RHODE ISLAND

February, 1945

MACHINE TOOL BLUE BOOK

PRODUCTION LINE DRILLING  
*and* COUNTER SINKING  
*Circle* **®** *Style*



These are Circle R combined drills and counter sinks. Today, they mean rapid production-line performance to many of America's largest industrialists, including leaders in both the automotive and aeronautical fields. • Made of high-speed steel in standard and special sizes to specifications.

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LOS ANGELES ROCHESTER INDIANAPOLIS DETROIT ST LOUIS

# *Cutting Tools Must Be Conditioned for Post War Production, Too!*

**Not All Men and Machines Can Be Released  
When the War Ends... Some Must Stay on the Job!**

When the war broke out, **Knock-Out Tool Grinders** were ready! They've been doing a Titan's job on production work and on tool maintenance throughout the nation and all allied countries. Now as the peace approaches, and thinking men are readying their plants for the tremendous production job which lies ahead, **Knock-Out Grinders** are again ready to accept the challenge!

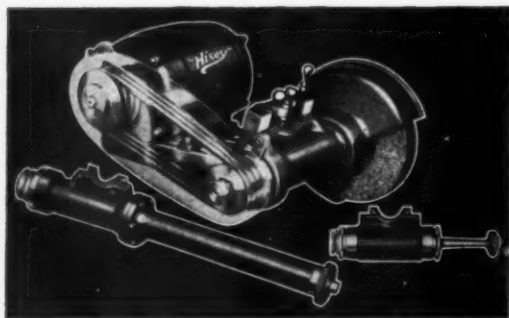
**Knock-Out** engineers have continually stayed on the alert giving users of **K-O Tool Grinders** many advantages, making difficult grinding jobs easy.

Single Speed or Multi Speed Wheel Heads are available. Wheels ranging from 1 to 10 inches can be used. Tools from the smallest to 12 inches in diameter can be ground with speed and accuracy.

When writing for literature ask for Unit No. 31-25.

**K.O. LEE CO.**  
**ABERDEEN, SO. DAK.**





*HISEY 3 H.P. Precision External Grinder with two interchangeable internal spindle units.*

## GRIND!

### INTERNAL EXTERNAL SURFACE PRECISION — PRODUCTION!

These precision grinding units can be mounted on lathes, planers, boring mills, shapers, milling machines, etc. for any type of precision or production grinding.

They are powered by constant speed (not series-universal) motors maintaining an even speed regardless of load as is so necessary for satisfactory grinding results.

Sizes range from  $\frac{1}{4}$  to 10 H.P. capacity. Pulley ratio can be changed to provide correct speed for any size wheel, vitrified or high speed (resinoid) bond.

*Catalog 70SH on Request.*





*The tougher  
the job...*

... THE MORE  
YOU WILL APPRECIATE  
THE CUTTING QUALITY

*of*

## **PUTNAM** *End Mills*

When the job is really tough, that is when Putnam Hi-Speed End Mills really display their lasting quality and outstanding cutting superiority. A deep cut . . . tough material . . . a smooth finish . . . a difficult shape—they're all the same to Putnam End Mills. Hundreds of different end mills are included in the Putnam standard line . . . all available to you right from stock. The end mill of the exact type and size required can be shipped you immediately—to reach you without delay!

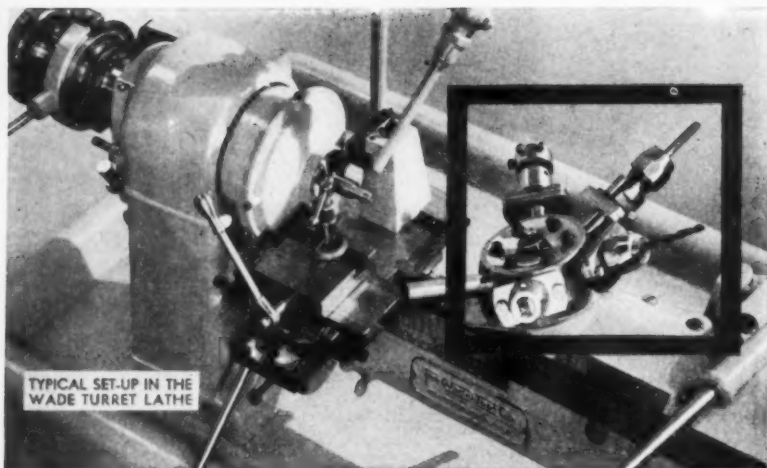
*Putnam offers* **THE COUNTRY'S  
LARGEST AND MOST COMPLETE LINE  
OF END MILLS**



**PUTNAM TOOL COMPANY**

2983 Charlevoix Ave.

Detroit 7, Michigan

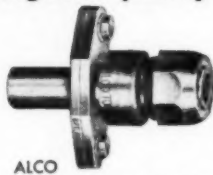


TYPICAL SET-UP IN THE  
WADE TURRET LATHE

**ALCO TOOLS** are being used in the  
better machines  
for producing the highest quality of precision work.



ALCO  
RELEASING  
BUTTON DIE HOLDER



ALCO  
RELEASING TAP HOLDER



ALCO  
DRILL CHUCK

When specifications call for work to be kept to close tolerances on precision threading, Alco Chucks and Holders deliver the goods. Absolute concentricity is assured with the now famous concentric alignment feature of all Alco Tools. The drill, the tap, or the die are positioned while the flanges on the holder are open, and when the flanges are tightened simply with one wrench on the studs, these tools are concentric with the work and stay that way.

Even wear on the cutting face of taps and dies and drilling on exact centers means longer life for your threading tools and improved production with no rejects. In war production, this all helps to reduce scrap and waste and speed the day of victory. In the post war era, Alco equipped screw machines will be better able to compete on price because of these economies. Alco Holders compensate for wear in the turret and the spindle and help to modernize old machines.

**ALCO TOOLS**  
EFFICIENT


SEND FOR  
CATALOG

**THE ALCO TOOL CO., 252 Birdseye St., Bridgeport, Conn.**

Detroit Office: 908 Stephenson Bldg., Phone Madison 5870  
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# ACRO

## Die set pullers



**GONE FOREVER**—battered and damaged die sets caused by prying or hammering. **ACRO DIE SET PULLERS** do the job the **FIRST** time. No Delay. Use **ACRO PULLERS** for safe sure separation. They are fast—accurate—positive. War plants using these pullers report savings as high as 50% in time alone.

**ACRO PULLERS** are indispensable for the grinding, mounting and fitting of punches, enabling the operator to raise punch from die easily, quickly and smoothly, positively holding the set at any desired height.

Order a set today. Convince yourself of the savings you can make in your tool room. **ACRO PULLERS** furnished in three sizes. Write now for more information.

**PROMPT DELIVERY**

## ACRO METAL STAMPING CO.

332 E. RESERVOIR AVE.

MILWAUKEE, WIS.

# 2 WIEDEMANN TURRET PUNCH PRESSES REPLACE 14 MACHINES!



## REDUCED AVERAGE PIERCING TIME ON SHORT RUN WORK APPROX. 90%

The two Wiedemann R-7's illustrated are in a line of four which have set new production standards for piercing sheets and plates in the plant of a large manufacturer of electrical equipment.

The R-7 permits 1 person to handle large sheets and plates . . . gauging arrangement positions work by direct reading Handwheels . . . Punch and Die required is positioned by operator through motor controlled turret . . . dimensions are taken from the drawing or from a chart . . . no layout required.

The R-7 Turret Punch Press is unsurpassed in efficiency—if you have sufficient volume of short run\* piercing, louvre and similar work to keep the R-7 operating 40 hours a week, the machine will pay for itself in two years or less.

Full details on the R-7 will be sent upon request. In addition, information will be sent gladly on smaller and lighter turret punch presses for handling lighter gauges and smaller material. The same basic economy is inherent in all machines. Write today.

### WIEDEMANN MACHINE COMPANY

1831 SEDOLEY AVENUE, PHILADELPHIA 32, PA.



#### THE JOB:

48" x 96" mild steel.

24 openings pierced requiring 6 different shapes and diameters.

Old method. 2 hours and 10 minutes.

Wiedemann Method. 12.57 minutes.

(Time includes loading and unloading of material in machine.)

Layout work done directly in the machine and is also included in above time.

Three similar pieces were produced in the same time.

\*In general, if the number of pieces does not warrant making a piercing die to do the piercing operation in a single purpose machine, then the job can be done quickly and economically handled on a Wiedemann Turret Punch Press.

WIEDEMANN TURRET PUNCH PRESSES & GAUGE TABLES



# *This VETERAN tapped 100,000 Small Brass Nuts*

ACTUAL  
SIZE →

Unretouched photo of  
tap at finish of job, en-  
larged 3 times, to show  
excellent condition of  
threads.

**TAP TIPS**  
**Number 3**  
**ALWAYS**  
**KEEP TAPS**  
**SHARP**

A prominent New England manufacturer put this tap through its paces. The job called for tapping 100,000 small brass nuts. At the end of the run, the last nut was threaded with the same precision cut as the first. The unretouched photo above, enlarged 3 times, shows the clean, sharp threads of the tap, at the end of the job.

The tap: — A WINTER BROTHERS 6-32 High Speed Commercial Ground Thread tap.

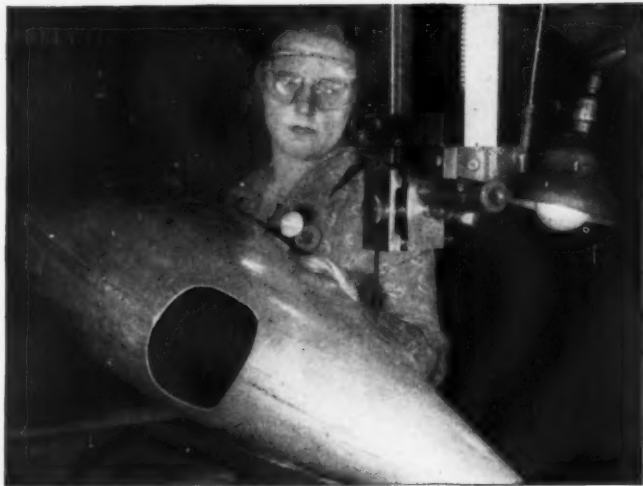
Just another example of what has been done with WINTER TAPS, under exacting requirements.

Your tapping can be improved with WINTER TAPS. Ask Winter Engineers for their recommendations.

A Division of National Twist Drill & Tool Co., Rochester, Michigan.

# Winter Brothers

COMPANY  Wrentham, Massachusetts, U.S.A.  
BRANCH STORES: SAN FRANCISCO CALIFORNIA CHICAGO ILLINOIS DETROIT MICHIGAN



# Friction Sawing with *Tannewitz* HIGH SPEED BAND SAWS

**Trimming formed parts . . . Cutting Sheet Steel, 1-inch Armor Plate, Plastics or what have you . . .**



**Write for  
Your Copy**

"The process is to some so spectacular that they refuse to believe their own eyes, and so safe, a woman can operate the machine." So writes the chief tool research engineer for one of the largest aircraft corporations. Previous cutting costs are radically reduced, difficult and slow cutting of certain materials made swift, easy and safe. By all means write for your copy of "FRICTION SAWING" by Arthur A. Schwartz, Chief Tool Research Engineer, Bell Aircraft Corporation, which will soon be off the press. It's free.

**THE TANNEWITZ WORKS** GRAND RAPIDS  
4, MICHIGAN



*The mark of a GOOD File*

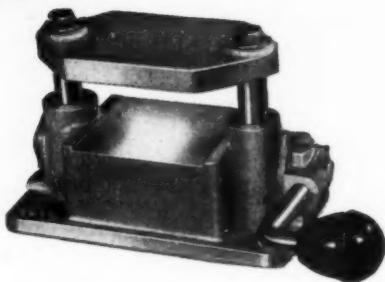
FORD—ace high in the field for twenty-five years—America's oldest manufacturer of rotary files—producer of the COMPLETE line. Write for catalog today.

**M. A. FORD MFG. CO., INC.**  
746 W. First Street • Davenport, Iowa

HAND CUT FILES • GROUND FROM SOLID CUTTERS • CARBIDE CUTTERS

# *Save Time* WITH ESCO "MIJIT" DRILL JIGS!

**For Fast  
Accurate Drilling  
Reaming, Facing  
and Boring  
of Small Parts**



Production time in the drilling of small parts can be cut tremendously by the use of Esco "Mijit" Drill Jigs because of the greater speed with which they can be loaded and unloaded.

Having a wedge-type locking unit which locks with the handle in any position as soon as the bushing plate touches the work, the Esco reduces clamping and unclamping-time to a matter of a few seconds.

Light in weight, and low in cost, the Esco "Mijit" is particularly well adapted for drilling, reaming and boring operations on small and delicate pieces, such as rifle parts, airplane parts, machine gun parts, gun sights, gun mounts, and automotive parts and accessories. Made in a wide range of models and sizes. Write for literature.

*Immediate Delivery*

**ESCO ENGINEERING CORP.**

**5987 Woodward**

**Detroit 2, Mich.**

*Write for*  
**LITERATURE**

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New York City

Branch Offices and Warehouses:

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Cleveland

24 W. Wellington  
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# Specify **ARO** PNEUMATIC TOOLS

ARO model 101 with plastic  
housing and handle—weights  
only 1 lb. 9 ounces—operates  
full 1/4-inch drill.

**Then...**

## **BRING ON YOUR TOUGH JOBS**

● Engineered to furnish *more power* than average tools of their size... ARO Pneumatic Tools get *more work done* with less fatigue!

Today—ARO Tools in war production are speeding up drilling, nut-setting, screw-driving, grinding and countless other small tool jobs. In reconversion—ARO Tools will gear industry to greater efficiency and faster output of peace-time products. Simple in design... rugged...dependable...stall-proof. Write for new catalog No. 44.

The Aro Equipment Corporation, Bryan, Ohio.



THE

# Waltham

CUTTER  
SHARPENER

**KEEPS CUTTERS  
IN PRODUCTION**

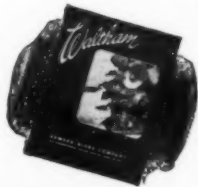


A sharp tool makes any machine perform better. On jobs requiring gear or thread milling cutters, straight fluted hobs and multiple cutters, not much over 2 inches in diameter and  $\frac{3}{8}$  inches thick, you can keep production at top efficiency by keeping cutters sharp on the Waltham Cutter Sharpener. This modern bench grinder is a precision tool, yet can be operated by anyone after a few minutes' instruction. It's a profit maker too — not only from the point of view of increased production from your cutters, but every cutter can be used up before it must be discarded. The Waltham can be used for radial or rake sharpening. Use the handy coupon for complete information.

*No machine is better than the cutting edge of the tool it uses.*

Please send me Bulletin No. 344 which describes the Waltham in detail.

The coupon will bring you new Bulletin No. 344 giving full information.



NAME \_\_\_\_\_ TITLE \_\_\_\_\_  
COMPANY \_\_\_\_\_  
STREET \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

H

**EDWARD BLAKE CO.**  
634 COMMONWEALTH AVE.  
NEWTON CENTRE 59, MASS.

BLAKE TAP GRINDERS—FILTARE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—  
BLACK DIAMOND PRECISION DRILL GRINDERS—WALTHAM CUTTER SHARPENERS

## Abrasive G-P DIAMOND TOOL KIT

ABRASIVE DRESSING TOOL CO.  
Detroit, Michigan  
1000 10th Ave. S.E. Grand Rapids, Mich.

# AT LONG LAST!

Diamond Tools for every purpose in a  
**HANDY, THRIFTY KIT!**

10 TOOLS  
2 HOLDERS  
2 KEYS

Complete in Handy Kit

only \$49.50

Each Kit with  
REGISTERED GUARANTEE

### Here's What You Get!

- ① Abrasive diamond tool with 2.5 carats of diamonds for straight dressing wheels up to 30" x 1 1/2"
- ① Abrasive diamond tool with .30 carats of diamonds for straight or form dressing up to 12" x 1"
- ① Abrasive diamond tool with .40 carats of diamonds for straight or form dressing up to 30" x 2"
- ① Abrasive chisel-type diamond tool for all sizes of radii.
- ① Abrasive Red Band with diamond at 65° included angle for 0.020 radius and larger.
- ① Abrasive Red Band with diamond at 85° included angle for 0.025 radius and larger.
- ② Abrasive Phonopoints for 0.015 radius and larger.
- ① Abrasive Diamond Scriber.
- ② Abrasive Tool Holders.
- ② Sturdy Keys.

**Important:** If your supply house has not yet stocked this G-P Kit, have them place your order . . . or place your own order direct for IMMEDIATE DELIVERY!

DISTRIBUTOR TERRITORIES OPEN—WRITE FOR DETAILS!

THIRD GENERATION OF DIAMOND EXPERIENCE

HERE'S YOUR CHANCE to get a matchless assortment of dressing tools, radius tools, cutting tools, phonopoints, a scriber and a pair of sturdy, hand tool-holders—a kit that meets practically ALL shop requirements—at a saving that speaks for itself!

And remember, you get *quality* tools, backed by three generations of diamond experience. The-Abrasive RED BAND of proven performance assures you *better* work, *more* work per set-up. Each kit is numbered for your protection. Place your order TODAY!

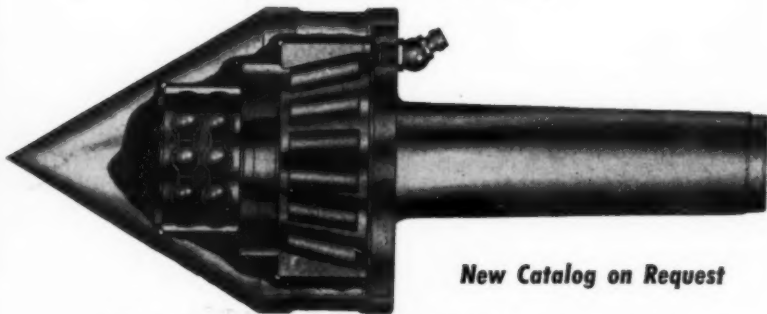
Abrasive  
DRESSING TOOL COMPANY  
Detroit, Michigan

# MARVECO

## LONG LIFE

When we speak of Marveco LONG LIFE, we mean that MARVECO is a PRECISION tool built to stand the gaff over a longer period of time than any other Live Center made.

*Have you tried your Marveco yet?*



*New Catalog on Request*

THE MARVECO is GUARANTEED to OUTPERFORM  
and OUTLAST any other LIVE CENTER.

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SEND US YOUR CENTER PROBLEMS

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**MARVEL TOOL &  
MACHINE COMPANY**

Exclusive Manufacturers of MARVECO ... The Live Center

**10977 W. JEFFERSON AVE., RIVER ROUGE 18, MICHIGAN**

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HOW TO "GO IN THE HOLE"

# PROFITABLY

- All drills make holes. How accurately, how fast, how often, and at what cost—that's different.

Celfor Drills and Reamers—tough, durable Products of Clark—afford a simple, practical means to "go in the hole" profitably. The Celfor Process preserves and utilizes the tough strength of finest tool steels. And Celfor Twist Drills are forged to shape, then *twisted hot*—densifies the metal, produces drills of maximum strength and exceptional cutting qualities.



Send for this **USEFUL BOOK**

A "must" item, if you want your drill data up-to-the-minute, is the Celfor Catalog—an exceedingly valuable book, containing much practical and helpful information.

Fill in the coupon and mail it—we'll do the rest.

## CLARK EQUIPMENT COMPANY

CLARK EQUIPMENT CO.  
302 E. 2nd St., Buchanan, Mich.

Please send me your Catalog of Celfor Drills and Reamers.

Name

Address

Company

Choose the  
Center with the

*Helical Groove*



**Longer running time between replacements**

To make machines run longer before requiring attention to centers — choose the center with the helical groove — made only by CMD. The exclusive advanced design, with the left-hand Helical Groove, assures more complete and longer lasting lubrication of point and work. No more burned-out center points! No stopping machine to relubricate center! No readjustments of tail stock! When CMD Helical Groove Centers are lubricated with CMD Center Point Oil, running time is frequently increased as much as 1500 per cent.

**Write for FREE Sample Kit**

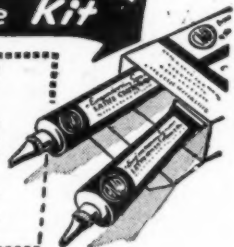
**CHICAGO MANUFACTURING & DISTRIBUTING COMPANY**  
Dept. 28B, 1928 West 46th St., Chicago 9, Ill.

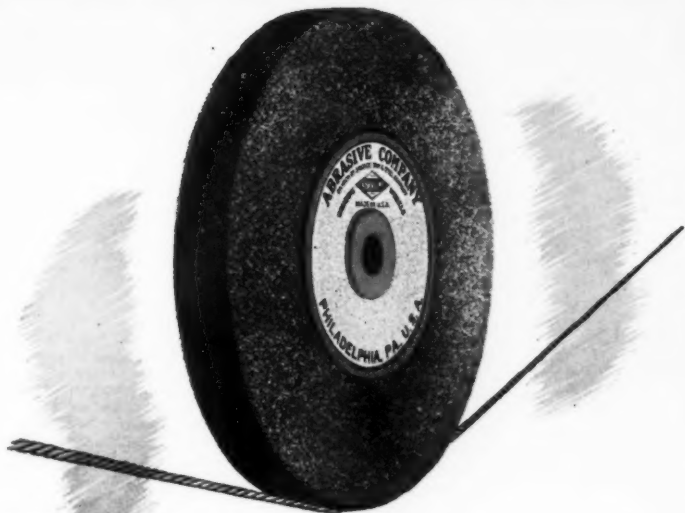
Send circular on CMD Helical Groove Centers.  
Without obligation to us, send FREE sample kit containing a tube of CMD CENTER POINT OIL and a tube of CMD CENTER POINT LUBE (grease) with directions for making an amazing, simple test.

NAME.....

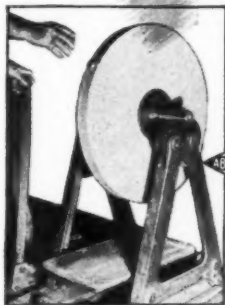
FIRM NAME.....

ADDRESS.....





# BALANCE



*Sensitive balancing ways are used to make certain of the accuracy of Abrasive Company Grinding Wheels.*

ABRASIVE

Balance might be the one word to describe Abrasive Company excellence. Mechanical balance is essential for efficient grinding and is a "must" in every Borolon and Electrolon Grinding Wheel. Balance prevents vibration and chattering; and lengthens the life of valuable grinding machinery. Balance starts with selection of raw material, and the manufacture of abrasive grains. Hundreds of balanced formulas produce just the right bond for many combinations of grade and density. Balanced

control of molding processes; balanced regulation of kiln heats and operation; balance in the finishing; and balance in tests and inspections are all basic to quality in Abrasive Company manufacturing.

Balanced inventories in factory stock and on distributors' shelves make Abrasive Electrolon and Borolon Grinding Wheels; Segments; Mounted Wheels and Points; Grains, Bricks, and Sticks available for your every specific abrasive requirement.



Division of Simonds Saw and Steel Company

ABRASIVE COMPANY • TACONY AND FRALEY STREETS • PHILADELPHIA 37, PA.

# 3 Lathe Operations

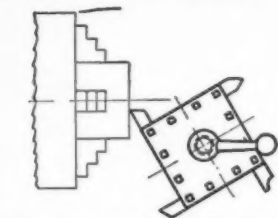
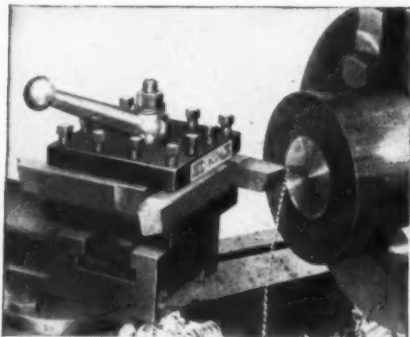


Photo No. 1— $\frac{3}{4}$ " square bit mounted in Model  $4\frac{1}{2}$ " S turret used to face work. Same tool is indexed to position and used for turning as shown below.

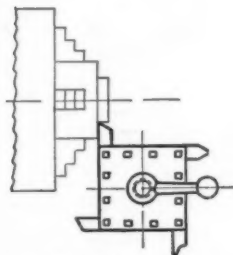


Photo No. 2—Side of tool is used to take a 1" deep broad-face cut.

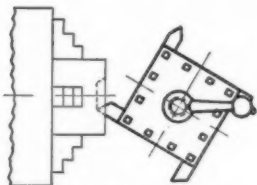
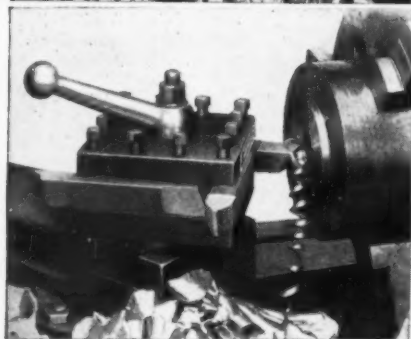


Photo No. 3—Same tool shown in photos No. 1 and No. 2 being used for inside chamfer.

**ENCO. Mfg. Co.**  
CHICAGO 39, ILL.

# with ONE Tool...

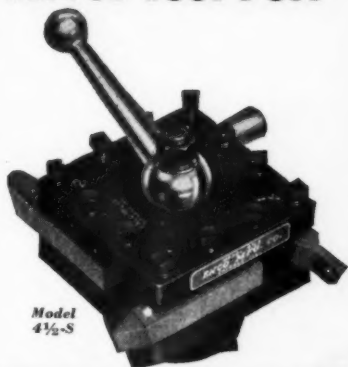
## Using ENCO'S New 12-Position

## Turret Tool Post

Here's an improved low-cost Turret Tool Post with *three* working positions instead of one for each tool. Turret block indexes at 30 degrees. Eliminates need for grinding special tools. Ordinary tools can be used as shown in illustrations at left. Saves time and increases tool capacity.

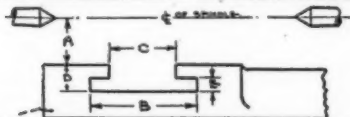
Also speeds production because turning, facing, boring, cut-off, threading and forming tools may be mounted in the turret block of your ENCO Turret Tool Post on your present engine or bench lathe. Fast action, positive indexing brings the next tool into position. Complete job can be set up at once saving valuable lost-time on second operation set-ups.

Turret keeps setting accurately. All models mount standard rectangular or square bits as well as standard cut-off blades and boring bars.



Model  
4 1/2-S

"A" Dimension range (from diagram on this page)	Model 6-S	Model 4 1/2-S	Model 3 1/2-S	Model 2 1/2-S	Model H
Lathe Swing	2"—3-1/8"	1-9/16"—2-1/2"	1-1/8"—1-3/4"	7/8"—1-5/16"	7/8"—1-5/16"
Maximum tool bit size	16" swing & up 1" or 1-1/4" 1-3/8" toolholder for 3/8" bit (Where no tool bit size is specified, turret will be furnished for 1 inch tool bit)	13" to 16" swing 3/4" or 5/8" (Where no tool bit size is specified, turret will be furnished for 5/8 inch tool bit)	10" to 13" swing 1/2" Sq.	Bench Lathe 3/8" Sq.	Bench Lathe 3/8" Sq.
SPECIFICATIONS	4 tool 12 position 6" square Packed in carton Shipping Weight 35 pounds Price . \$99.00	4 tool 12 position 4" square Packed in carton Shipping Weight 16 pounds Price . \$49.50	4 tool 12 position 3-1/2" square Packed in carton Shipping Weight 8 pounds Price . \$35.00	4 tool 12 position 2-1/2" square Packed in carton Shipping Weight 4 pounds Price . \$23.00	6 tool 12 position 3" Hex Packed in carton Shipping Weight 4 pounds Price . \$25.00



Make of Lathe and Size	A	B	C	D	E	Maximum tool size desired

### IMMEDIATE DELIVERY

on Turrets for these lathes: Atlas, South Bend, Logan, Sheldon, Clausing

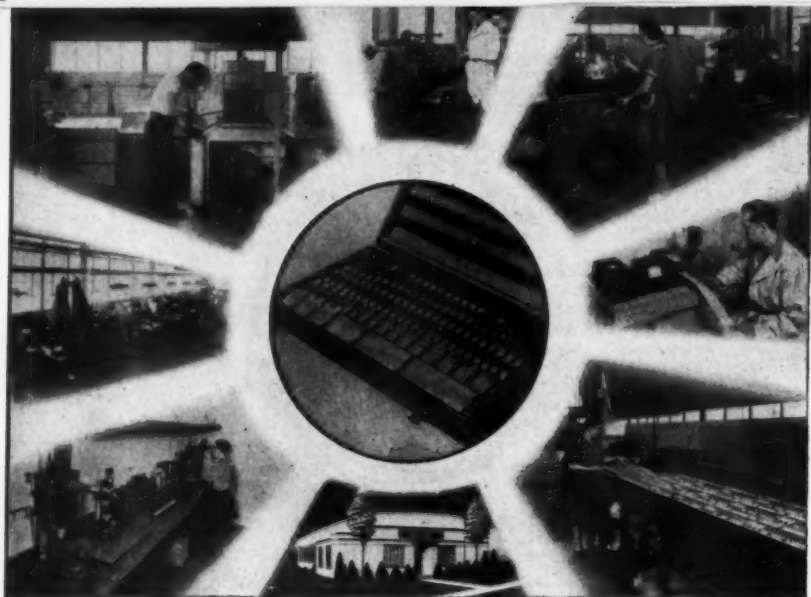
Also all models with machinable base on center post for quick adaption to your lathe.

One-week delivery on ENCO Turret Tool Posts made to specifications. When ordering, furnish all required dimensions and tool size desired and name and address of regular dealer.

## ENCO MANUFACTURING COMPANY, Dept. 35

General Office and Factory:  
4522-24 FULLERTON AVE., CHICAGO 39, ILL.

Eastern Sales Offices: (Complete stocks carried)  
129 CROSBY ST., NEW YORK 12, N.Y.



## The Science of Precision Gage Making WEBBER GAGE COMPANY

Over a long period of years the growth of the Webber Gage Company has been constant. Today in a plant designed, built and equipped for the rapid production of precision gage blocks Webber has become the largest exclusive manufacturer of gage blocks.

Illustrated are a few random shots of operations and modern equipment used in the manufacture of Webber Gage Blocks and some of the instruments used for testing them while in process.

Here you get a glimpse of the painstaking care taken at various steps in the manufacture of the gage blocks from heat treating to shipment.

It has always been the Webber policy to maintain the most up-to-the-minute equipment for production and the most modern instruments for testing.

Now manufactured in this air conditioned plant — tested in temperature controlled rooms — Webber offers the ultimate in precision gage blocks.

***Make your next set of blocks — Webber Gages.***



**Webber  
GAGE COMPANY**

12905 TRISKETT RD. • CLEVELAND 11, OHIO



# A "WAR VETERAN"

## with a distinguished Service Record

Long before Pearl Harbor, Dremel MOTO-TOOL won its spurs by the way it tackled tough jobs in tool rooms and machine shops, and on production lines. But since American industry swung its full strength into war production and our armed forces established far flung assembly and repair bases the already healthy demand for these mighty little midgets has quadrupled.

Operators as well as owners of Moto-Tools are constantly discovering new jobs . . . new ways to save time and cut costs . . . with these pocket size machine shops. Girls quickly become proficient in the use of them because a Moto-Tool weighs but 13 ounces, is shaped to fit the hand, has a balanced armature to prevent vibration. Thousands of Moto-Tools are helping to establish production records in plants such as General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft, Northrup, Douglas, and many others. Besides, Moto-Tool has won the respect of every branch of the U. S. land, sea and air forces.



Model 2 Moto - Tool, complete with 23 accessories, in felt-lined hard wood case . . . \$23.50.  
Model 2 Moto - Tool only, with one emery wheel point . . . \$16.50.

### DREMEL MOTO TOOL

A FEW OF THE  
MANY JOBS THAT CAN  
BE DONE BETTER AND  
FASTER with MOTO-TOOL.

- |                                      |                                     |                                   |
|--------------------------------------|-------------------------------------|-----------------------------------|
| <input type="checkbox"/> Sharpening  | <input type="checkbox"/> Burring    | <input type="checkbox"/> Cleaning |
| <input type="checkbox"/> Finishing   | <input type="checkbox"/> Grinding   | <input type="checkbox"/> Routing  |
| <input type="checkbox"/> Touching Up | <input type="checkbox"/> Polishing  | <input type="checkbox"/> Cutting  |
| <input type="checkbox"/> Sanding     | <input type="checkbox"/> Burnishing | <input type="checkbox"/> Rasping  |
| <input type="checkbox"/> Drilling    | <input type="checkbox"/> Inlaying   | <input type="checkbox"/> Carving  |
| <input type="checkbox"/> Mortising   | <input type="checkbox"/> Sawing     | <input type="checkbox"/> Brushing |
| <input type="checkbox"/> Engraving   | <input type="checkbox"/> Scoring    | <input type="checkbox"/> Dressing |

A Model 2 Moto-Tool develops 27,000 rpm . . . the proper speed for clean, smooth, accurate work, and long life from points and cutters. It is sturdily built throughout and has a shock-proof bakelite housing and oil-less (oil sealed) bearings. Uses 110-120 volt AC or DC current. Ask your Mill Supply salesman or write the factory or representatives below about Dremel Moto-Tools and accessories.

#### DREMEL MANUFACTURING CO.

Dept. 215-B

Racine, Wis.

Federated Sales  
2437 W. Valley  
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Mill Factor Products  
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F. W. Fowler  
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J. J. Backer  
2321 Second Ave.  
Seattle, Wash.

# *Again* **ELGIN** *Leads*

*with . . .*

**COMPLETELY WIRED  
PRECISION LATHES  
in self-contained units**

Time, labor and effort are conserved with the new Elgin "Desk" type lathe.

Base of the mounting affords generous leg room and a foot-rest for the operator when seated. Ample drawer space for storage has also been provided.

Range of the variable speed drive has been expanded upward and downward, so that stepless spindle speeds ranging from 40 to 4,000 rpm are available.

Top right drawer is fitted for holding collets. Bottom drawer provides storage space for face plate, three and four jaw chucks, drill chucks, etc. Two other drawers provide additional storage space.

The lathe, itself, is a standard Elgin precision bench type with a 1" collet capacity, 9" swing and a maximum capacity between centers of 17".

★ **ELGIN TOOL**  
**1772 BERTEAU AVENUE**





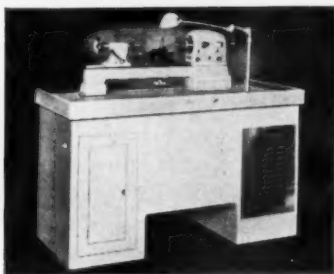
The new Elgin precision bench lathe ensemble is completely wired and ready for use. Push buttons give easy control of the electrical functions. A flick of the speed control lever at the left provides just the right speed for the job at hand.

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Rear view of the precision bench lathe ensemble emphasizes sturdiness and convenience. All parts are readily accessible.

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RELIEVED CUTTERS

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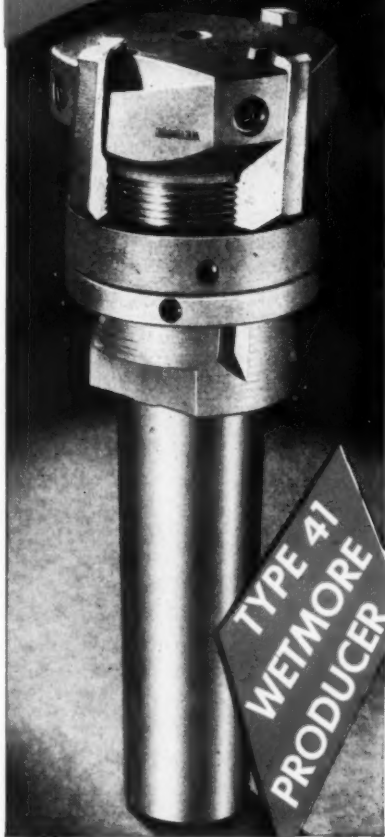
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**THIS WETMORE PRODUCER  
IS A  
RUGGED TOOL**



**TYPE 41  
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PRODUCER**

**removes  
more  
stock—  
faster,  
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**...and is  
adjustable  
for wear**

Send for our New Tool Guide  
—it is full of data, information  
and specifications . . . Free  
to executives and engineers.

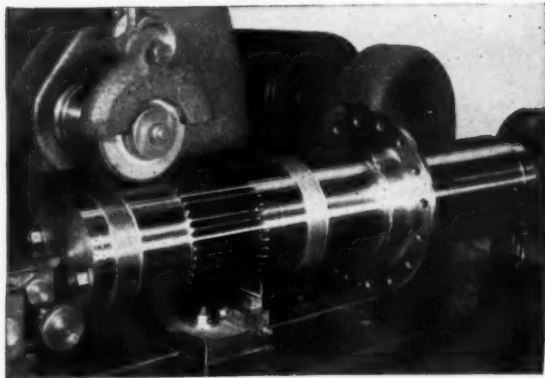
*Send for the New REAM-MON blade bulletin for complete details.*

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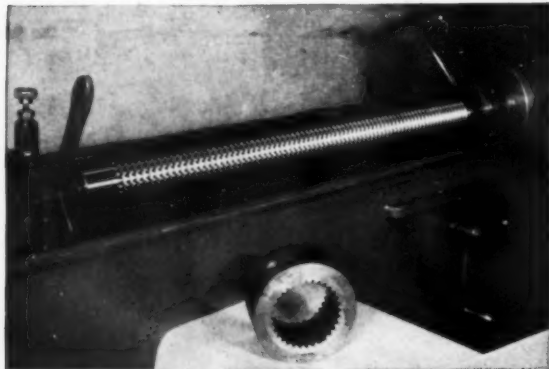


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Aircraft  
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You don't drive your car farther than necessary in low or second gear. Yet in effect that's exactly what you may be doing with some of your machine tools.

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There's a BERKELEY drive for practically every size, type and kind of machine tool. They cost little to maintain and speedily repay the original cost by enabling you to gain the benefits of modern carbide tooling.

There is no obligation in putting your drive problems up to BERKELEY.

**BERKELEY EQUIPMENT COMPANY**  
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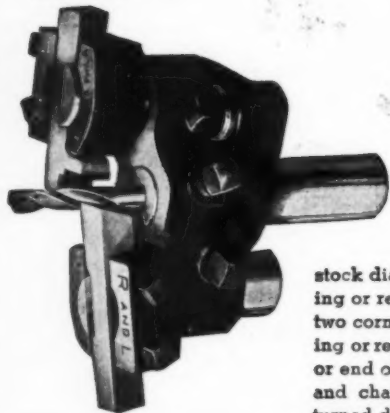
DO YOUR PART  
FOR THE MEN  
AT THE FRONT

WITH

AND

R L

TOOLS



R and L—the *time saving* turning tool is the answer. It will do the work of 14 different tools now being used in your shop.

It can be changed from right to left or left to right in 10 seconds. The only tool on the market of its kind.

No wasted time in set-up; performs many operations at once, such as: turning shoulder concentric with stock diameter; turning two diameters while drilling or reaming; turning one diameter-chamfering two corners, facing end of part along with drilling or reaming; turning and forming special shape or end of part while drilling or reaming; drilling and chamfering; pointing work concentric with turned diameter. *Write for detailed information.*

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- More pieces between grinds
- More grinds per tool
- Less down time
- Lower tool cost



TECO Cemented Carbide tools have earned their place in metal-working plants the slow but conservative way... on the basis of proof, not promise. This is the most practical way for you to select carbide tools.

**MAKE THIS CHANGE!** Tool up a machine or two with TECO Cemented Carbide in place of your present carbide tools. Run the job exactly as before, then let results speak for themselves.

You'll find the harder, denser, more uniform TECO Cemented Carbide has greater resistance to wear and breakage in high speed turning, boring and facing. One of our tool engineers will gladly discuss your needs or arrange a test run, at your convenience. Send for catalog and price list.

**IMMEDIATE DELIVERY FROM STOCK**  
can be made on most standard TECO  
Cemented Carbide Tools and Blanks.



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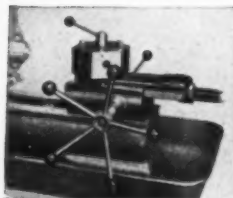
Pioneers in Tungsten Carbides  
for over a Quarter Century



## **CEMENTED CARBIDE**

# These Globe products do precision work

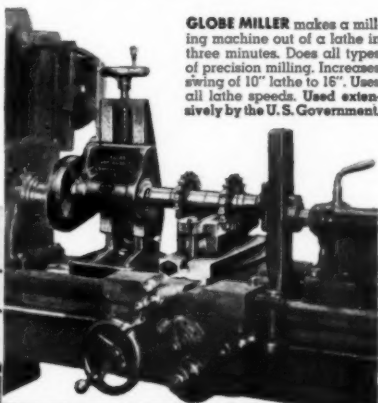
**Compact, Rugged Construction, Low in Cost! Immediate Delivery**



**GLOBE HEAVY DUTY BED TURRETS.** Adaptable to any lathe.  $4\frac{1}{4}$ " travel. Precision built. Rugged construction.



**GLOBE CROSS SLIDE.** Adaptable to any lathe.  $3\frac{1}{4}$ " travel. Rugged construction.



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Milling arbors. 4", 8", and 12".



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- 4 Threadwell greaseless rust-proofing — clean and dry to handle, always ready to use.
- 5 Threadwell Tap service — personal attention to your tap needs at the factory and from your Threadwell distributor.

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SINCE 1903  
"TAPS OF DISTINCTION"

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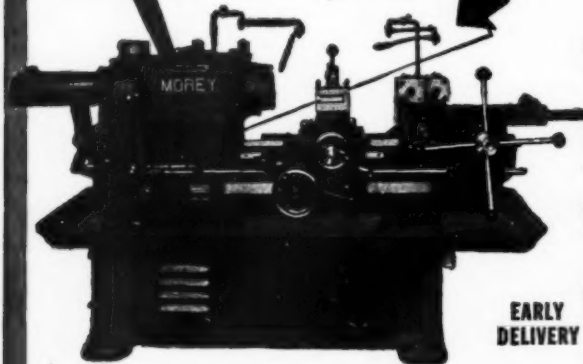
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UNIVERSAL  
or PLAIN

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For bar stock up to 1 1/2" in diameter  
18" turning length  
18 1/4" swing over bed  
Infinite spindle speeds: 25 to 1800 RPM, constant speed motor, 1500 RPM  
AVAILABLE ALSO WITH PLAIN CROSS SLIDE  
Ask for Circular 721A



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For bar stock up to 1" in diameter  
Turning length 8 1/2"  
Swing over cross slide 8"  
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Maximum of 60 RPM  
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Constant horsepower at all speeds  
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For bar stock up to 2" in diameter  
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DIRECT BELT DRIVE AVAILABLE AT HIGH SPEEDS  
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GEARED SPINDLE SPEEDS  
INSTANTLY AVAILABLE  
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RIGID—WITH SUFFICIENT  
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WILL WITHSTAND.

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MATICALLY UNCLAMPED,  
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THREE TYPES OF CROSS  
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FOR THE UNIVERSAL CAB-  
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MOVEMENT OF THE LEVER.



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MACHINE IS ENGI-  
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MACHINE TOOL BLUE BOOK

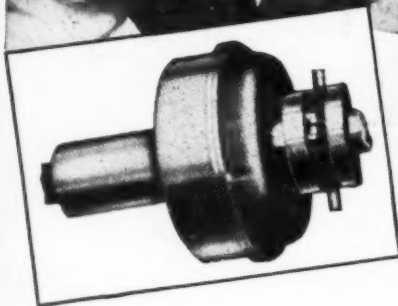
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WORRIES  
ARE OVER"**

*When You Install*

## **HANSON** *Friction Clutches*



Hanson Friction Clutch Type "C" was designed to fill the need of a low price coupling to operate at moderate speeds. Each and every Hanson

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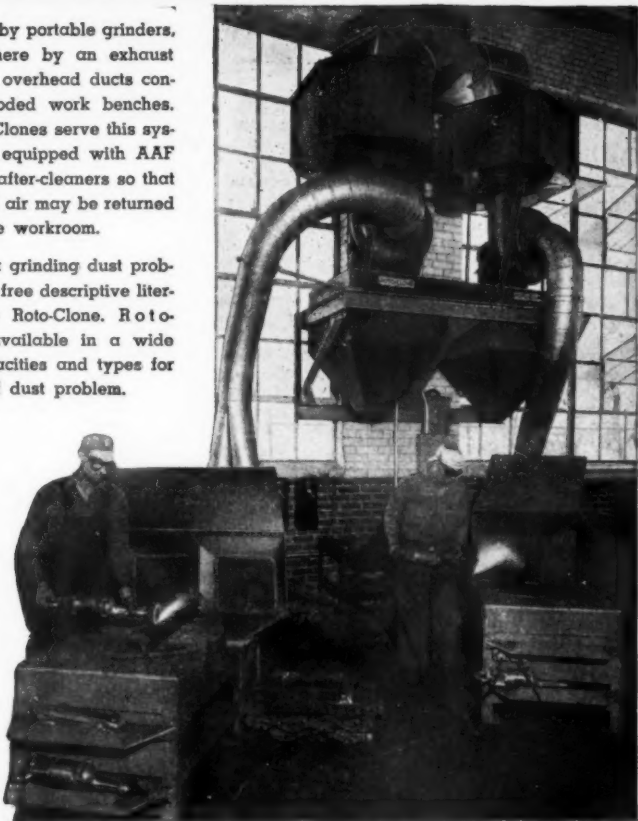
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Dust, created by portable grinders, is collected here by an exhaust system using overhead ducts connected to hooded work benches. Type D Roto-Clones serve this system and are equipped with AAF viscous filter after-cleaners so that the exhausted air may be returned cleaned to the workroom.

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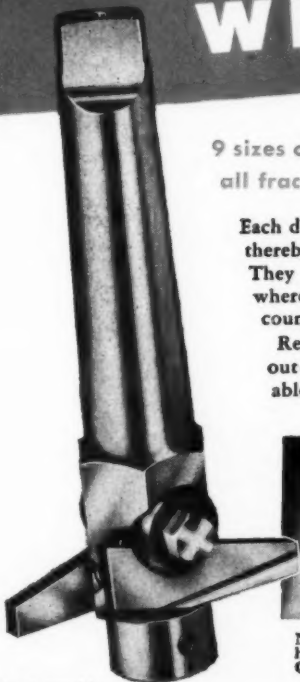
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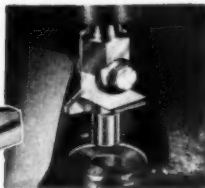
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9 sizes of Clark Adjustable Counterbores cut all fractional diameters from  $\frac{1}{4}$ " to  $5\frac{1}{2}$ ".

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No de-burring of pilot holes necessary with Clark Counterbores.



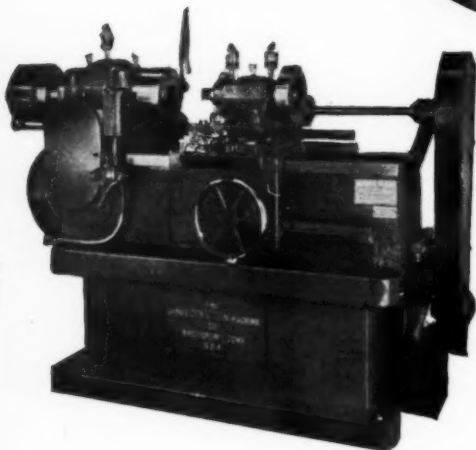
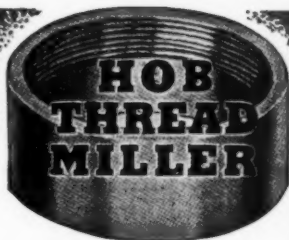
Clark Counterbores spot face as well as bore

Clark Adjustable Counterbores are easily expanded. Simply loosen the locking bolts and slide cutting blades in or out. Blades are removable for sharpening.



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FOR THE RAPID  
DUPLICATION OF  
RIGHT OR LEFT  
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Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct pitch and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of speeds and feeds.

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**TAP LIFE INCREASED**

**From 7 to 84 Pieces  
per Sharpening . . . by**

***Cold Treating* in a  
*Deepfreeze* Industrial  
Chilling Machine!**

*Deepfreeze Cold Treatment Cuts  
Costs by Increasing Tool Life . . .  
Increases Production by Cutting  
"Down Time" of Machines on  
Vital Operations*

The value of applying Deepfreeze cold treating to increase cutting life of small tools is exemplified by the experience of this manufacturer. In tapping tank drive gear parts it was found that after machining a relatively few pieces, the crest of the  $\frac{1}{2}$ " pipe tap burnished or the tap chipped on face of thread. This made frequent sharpening necessary, proved extremely costly and slowed production considerably.

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Kempsmith Standard Swivel Vise with removable jaws and coolant return channel can be used. Standard plain vises and heavy-duty plain and curved vises, also available.

*Vises*

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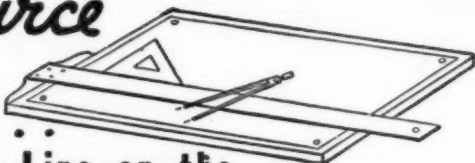
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Copper, Forged  
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Magnesium Crystals

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HAMMER BLOWS

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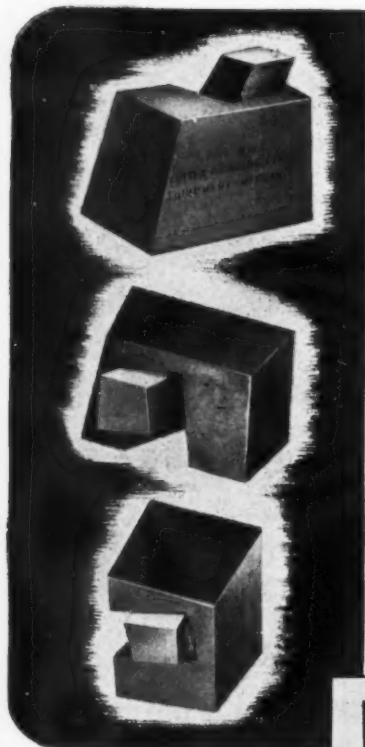
All angles on the cutters are predetermined by the hardened and ground sides of the grinding fixture thus assuring you a minimum of grinding and no repetition of work to correct errors.

It not only enables you to grind cutters faster but gives more grinds per tool bit.

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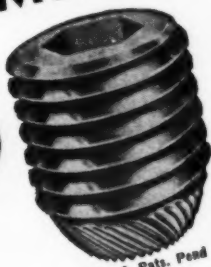
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**Self-Locking  
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## BLUE BOOK *Presents . .*

Honing has long been esteemed as a surface finishing process. New developments have expanded it into a production operation on a commercial basis. The new developments range from a plastic holder for the honing stone to a built-in gage that permits constant testing for dimension without work interruption. See page .....135.

Machining of aluminum and non-ferrous materials is covered in the current section of articles on the Art of Metal Cutting. This series, sponsored by the Technical Division of Wesson Tool Co., Detroit, include a vast amount of interesting and valuable information on carbide tooling. In the near future, problems of converting to carbide tooling will be discussed from a practical standpoint. See page.....151.

Higher speeds in milling have introduced some new problems in spindle design. New developments have also been made in milling cutter design. Some important considerations on these topics will be found in the Trend Section starting on page .....165.

The Dynamic Side of Foremanship is discussed in the article commencing on page .....182.

Figuring Excess Profits is the topic of Arthur Roberts' current tax problems article beginning on page.....206.

Some uses of pneumatic cushions in machine shops are described by Ed. C. Powers in the story commencing on page .....218.

When questions or disputes arise about designs, it helps to have specifications and pertinent data inserted on layout drawings. H. F. Williams tells you how on page .....225.

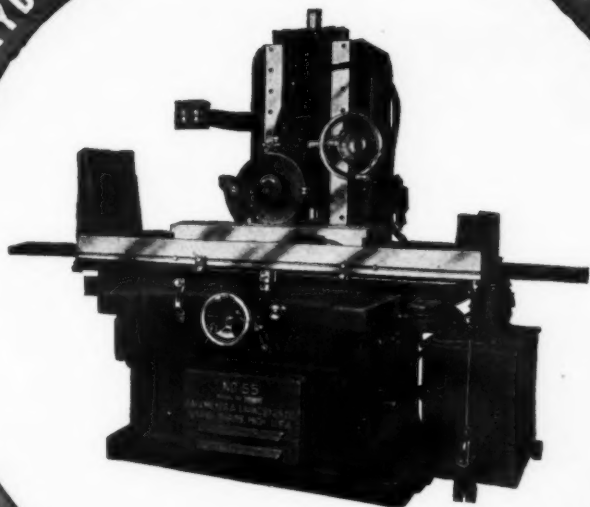
Friction Sawing has aroused a lot of interest recently. It has many uses, some of which are described in the story commencing on page.....240.

Helpful kinks and ideas will be found in the Shop Notes section commencing on page .....264

The regular monthly parade of new machines, tools and equipment will be found in the section commencing on page..288.

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# AS THE *Editor* SEES IT



**C**OMPLACENCY on the home front was rudely jolted by the Nazi break-thru into Belgium. For a time the situation seemed critical. Now that the panzers have been shoved back . . . and the Russians are blasting gaps into the Eastern front, we must guard against another surge of over-optimism. The Germans still have terrific striking power and the war in Europe will not be over until the last Nazi has been liquidated.

Von Rundstedt's gamble was costly for him and for us . . . but we can replace our losses more readily. That's a vital point in this war of attrition.

Meanwhile McArthur is forging on to Manila. This conflict in the Pacific is for us the most important war of all times. Ralph A. Bard, under-secretary of the Navy, points out that a Jap victory and domination of the land masses of Asia, containing over half the population of the world probably would utterly destroy civilization as we know it.

Whenever we think of letting-up, we must remember that the military and economic situation of Japan is not so weak as complacency may lead us to think. By making the cost of American victories as high as possible, the Japs hope that a great wave of war weariness may sweep over America

after the defeat of Germany.

If we settle for anything less than a total knockout, we are letting our men down and setting the stage for another Pacific war . . . which their children will have to fight.

As a result, the heaviest burden in history now faces workers in American war factories. It will take days and weeks of effort to replace equipment that is being used up and destroyed within a few hours at the present fighting tempo. We must increase the vast quantities of ammunition, weapons and equipment we have been sending overseas and we must do it at once.

The more fire-power we are able to throw at the Nazis and the Japs, the less will be the cost to us in blood and American lives.

As our President has recently emphasized, "We cannot afford to fight the war of today or tomorrow with the weapons of yesterday."

The only way to meet the increased needs for new weapons and more of them is for every American engaged in war work to stay on his war job and give it his best. Men and women not engaged in essential work should go out and get war jobs. Our labor and petty annoyances here on the home front cannot be compared with the every day sacrifices which our fighting men are making.

---

*Wesley G. Paulson*

---



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# A NEW BASIS

*for*

# HONING

By P. D. AIRD

**E**XPANSION of the process of honing from a finishing also to a production operation has been accomplished on a commercial basis thru development of a new concept of the possibilities the method offers.

The development has been many-sided, ranging from a new and improved plastic

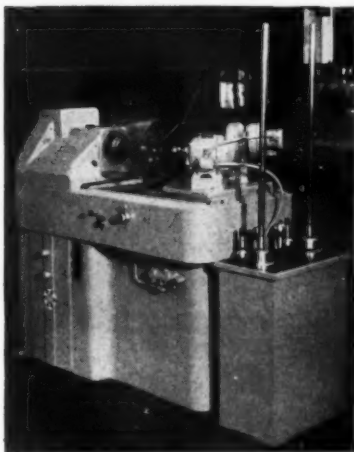
holder for the honing stone to construction of a honing machine with an automatic built-in gage that permits constant testing for dimension without interrupting the process.

And tho it has been demonstrated by installation and by production experience that the new method is commercially acceptable, production of the new equipment is still on a restricted basis and is expected to remain so until wartime regulations are modified. Even then it is anticipated that manufacturing facilities will not permit immediate acceptance of all contracts.

Announcement by the Micromatic Hone Corp., Detroit, of its development at this time is made with the idea that along with the other postwar thinking and planning in industry, their tools should occupy an important and significant part in the world to come.

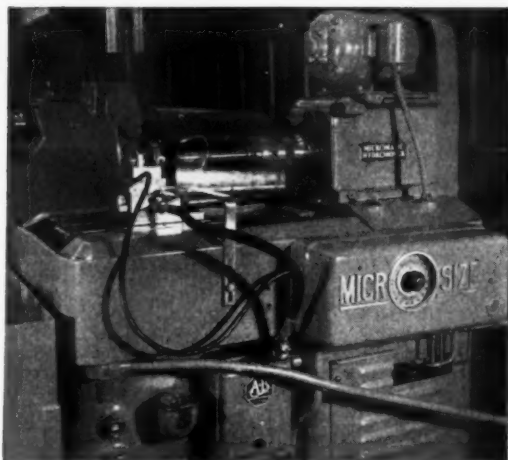
One of the by-products of wartime production has been improved methods and machines for accomplishing set tasks and tho this development is incidental in the case of Micromatic Hone, it nevertheless promises to have an effect on manufacturing methods when civilian production again is the concern of manufacturers.

A fundamental factor in the transition of honing from a production finishing to a production-processing operation is in the Micromatic Microsize control, a positive, fully automatic method of generating uniform size. This makes possible either multiple or progressive honing, something that heretofore was regarded as impossible.



Multiple honing is possible on an individual or a progressive basis as is the case in the three spindle set-up here. A constant gage is kept on the work thru a device on the end of the honing stick, which trips a switch when the correct dimension is reached, causing the honing slab to withdraw from the work. All controls are located on a panel in front of the operator.

Another application of the MicroSize control unit on a hydro honing installation. The operation is controlled by the dial in the lower right section of the machine.



Under conventional methods in honing, it was necessary to stop work from time to time to gage progress and check the dimensions with an indicator or plug gage. This is no longer necessary, for it is possible to keep a constant check on the work in progress and its dimensions thru use of a sizing apparatus which gages the work each stroke without stopping the process for an instant.

This is accomplished thru use of new type honing stone members which have abrasive sticks molded into a thermo-setting plastic base. Projecting beyond the end of the honing stick is a tab of plastic. When the honing stick comes to the end

of its reciprocating travel, the tab enters a ring gage that is built into the machine.

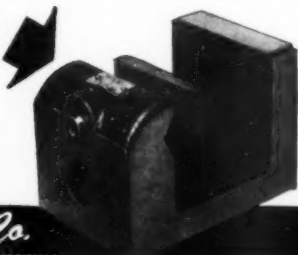
The moment that the correct dimension has been reached the tab touches the gage edge, friction turns the gage on its mounting and that almost feather-like motion trips a switch stopping the expansion and causing the "run-out" circle to begin, which improves the quality of the final finish.

Thru use of this positive control of dimensions it is possible with multiple spindles, to rough and finish hone in high production, thereby materially reducing cost of the operation.

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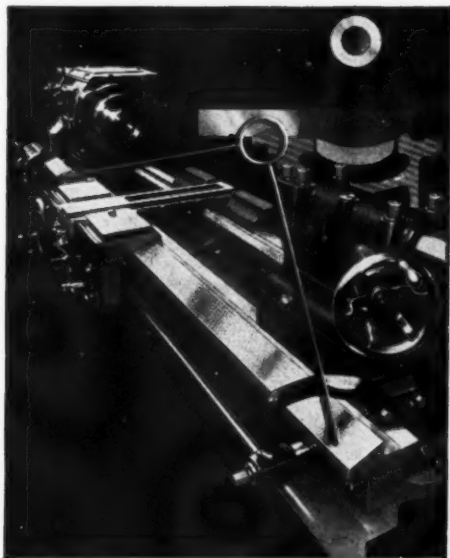
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Also important in this development is the design of the honing tool itself. It is so constructed that there are more smaller sized abrasive sticks in the tool rather than a few large ones. The sticks are easily replaceable, and the use of several small stones reduces cutting time without sacrificing dimensional control or abrasive life.



Control units in some installations are located away from the work, as in this case where the control units are on the side of machine, leaving the operating area clear for the work. Within limits, the honing control units may be installed on older model machines, permitting more widespread use of the controls without the necessity of waiting for completely new machines.

Along with the use of the mechanical type Microsize control on small work has come a development for control of dimensions on larger pieces thru utilization of the principle of fluid pressure called Hydrosizer. In this control, either the machine's own coolant oil or air may be used to gage the work in much the same way that air pressure is used in air gages.

The shop which builds a variety of products in varying size lots, needs something much more flexible than the conventional type of precision boring machine. It must be able to handle jobs both large and small with a minimum of set-up and change-over time. It must be quickly aligned, equipped with an accurate method of spacing holes and a quick means of changing speeds and feeds.

# **SIMPLEX**



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A SIMPLEX 3U Knee Type Precision Boring Machine is here shown with an indexing fixture for precision boring several parts in a heavy transmission. The hole sizes differ, so a quick means of changing speed is of great advantage. Various fixtures are used which can be made of the most desired proportions and the machine adjusted to suit the work. Boring and facing feed changes are quickly and conveniently made by means of the star knobs on the bed. All controls are within the operator's easy reach. One of the most valuable features is the fact that when once set up for a job, operation is reduced to loading and unloading the work and pushing the starting button. Let our representative study your work and tell you more of the many advantages of these advanced designs.

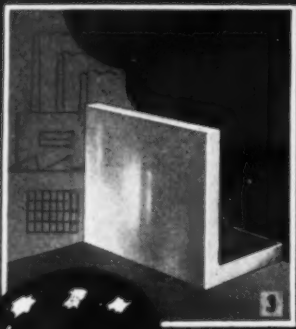
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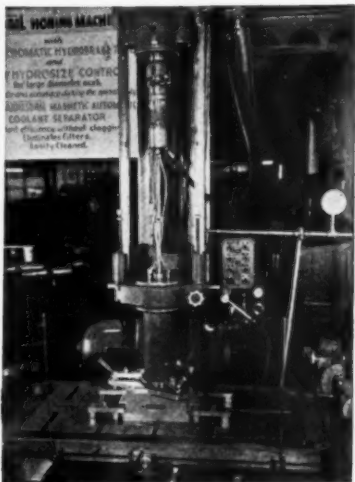
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As the work progresses, fluid squirts from several jets in the tool body against the interior of the work, and its back pressure is measured and registered on a dial. As the interior is gradually enlarged, the back pressure gradually diminishes. Since the pressure previously had been calibrated over varying dimensions, the operation can be halted as soon as the dimension reaches its proper reading, since the dial correctly informs the operator of the constant progress of the work. It is possible to make the entire honing operation automatic, setting the limit in advance and stopping the operation by mechanical means once it has been reached.

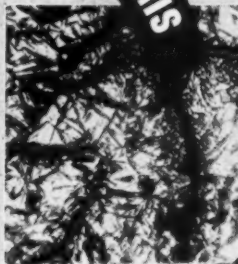


The amount of back pressure exerted by coolant as it is pumped against the face of the work controls the honing dimensions in this machine. The degree of back pressure necessary is calibrated in advance and the honing is held within the dimensions thus established. The gage at the right of the picture shows the pressure in the hydraulic system. This type of control is used on large diameter work.

In the use of Hydrosizer control, as in the use of the Microsize unit, limits can be set in advance by a supervisor in much the same way that a job setter operates

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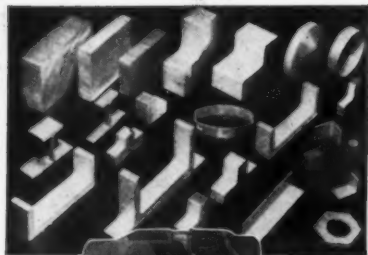
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AUTOMATIC CUT-OFF MACHINE  
MODEL MH

on machining routine, leaving the actual honing operation to less skilled operators.

In the field of honing smaller parts where Microsize control is utilized, the use of multiple spindles is regarded as being of outstanding importance. This fact together with the possibilities of progressive or multiple honing combine to make possible substantial savings in cost.

It is possible for instance, in a progressive honing operation to rough hone, semi-finish and finish, loading one piece at a time, accomplishing a maximum total stock removal ranging from .007 to .012" depending upon the size of the diameter bores.



Microphone units are self-contained and designed with an idea of saving floor space. The guard shown over the work here is used only on occasion.

Where two operations are required—rough hone and finish—there is one-piece loading with one station left vacant for cooling after the rough honing operation. Where there is only one operation involved, it is possible to load two pieces of work at a time for multiple honing. In this operation, maximum stock removal ranges from .0005 to .0015" for hard-

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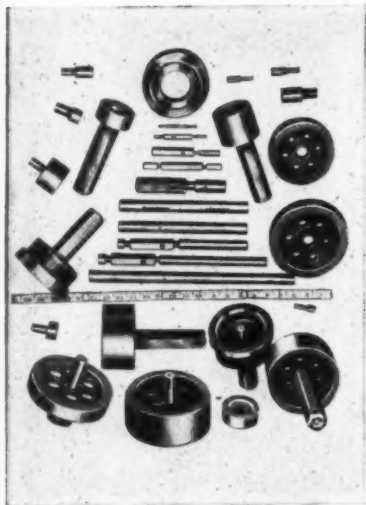
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ened parts, and .001 to .003" for soft or medium hard parts.

In the honing machines for smaller work, each honing spindle has individual gage control, making possible automatic production of uniform size at an unprecedented rate.

Tho not a production manufacturing firm, Micromatic engineers nevertheless felt it was necessary to study pilot use of these machines on mass production jobs. Accordingly they contracted for a precision bearing job which required strict adherence to dimensional limits. The operation called for a broached hole which in turn was silver plated. The job then required boring of the inner diameter to size. It was required to grind a large and a small outer diameter and face to size and then to finish the inside diameter within the close tolerances demanded on the job.

The job had been in production under conventional means long enough to provide an adequate basis for comparison of the two methods, since time studies had been made on every step of the process. It was found that a total of three minutes and 36 seconds was the minimum amount of time required to finish the bore of the part within the established inspection limits. Thru the use of honing machines equipped with Microsize control, the job was completed with one less machine and with one less operator with a time total of two minutes and 30 seconds. Since the contract was quite an extensive one and records were kept thruout its career in the plant, it was felt that the performance on this job justified the earlier predictions of time and labor savings possible thru the use of the honing process.

So revolutionary is the new process in the opinion of Micromatic engineers, that it permits a new approach to the whole problem of parts manufacture, particularly involving the creation of holes whose dimensions are required to be true and round. It is possible to create these parts whose dimensions conform to the closest tolerances without immediate regard for the outside dimensions. That is to say, if the inner dimension of a part can be brought to specified limits first—as is possible in the honing process



# Lodge & Shipley Lathes at work

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**250% INCREASE**

IN PRODUCTION OF  
TRANSMISSION MAINSHAFTS

**AT AUTOCAR**

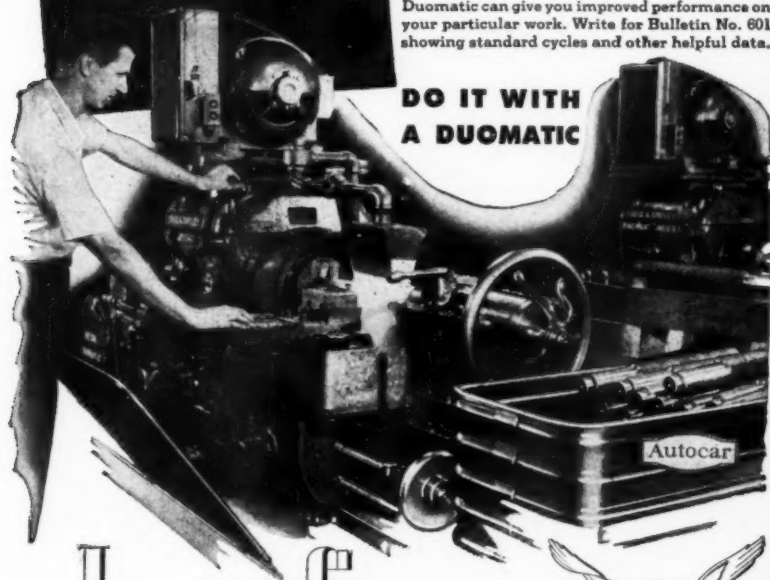
• Men responsible for greater output of Autocar's famous heavy duty trucks, are convinced of the unusual efficiency of Lodge and Shipley's full automatic lathe—the Duomatic. Here is what these production-minded men have to say about Duomatics they recently installed:

"Our transmission mainshafts are finished in four operations—two roughing and two finishing. The combined floor-to-floor time of these four operations is approximately 18 minutes. We previously used engine lathes on this part. Now, with our new Duomatics, we show a production increase of 250% over the old method."

In shops of every size and type, handling large or small lots, the Duomatic repeatedly demonstrates its amazing efficiency. Dual tool slides—front and rear—operate singly or together... are easily swiveled to cut from any angle. All movements and set-ups are entirely mechanical.

Have Lodge and Shipley Engineers show how the Duomatic can give you improved performance on your particular work. Write for Bulletin No. 601 showing standard cycles and other helpful data.

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# 19

A Set of **Nicholson**  
**E-X-P-A-N-D-I-N-G**  
**MANDRELS**  
**209** *does the work of*  
**Solid Arbors**

NICHOLSON EXPANDING MANDRELS handle all bores from  $\frac{1}{2}$ " to 7", representing remarkable savings in money, as well as in man and machine hours. Hardened tool steel, accurately ground. Two types, all sizes; sold singly or in sets. Prompt delivery. Bulletin 1043.



## TYPE A—STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Length Overall
1A	$\frac{1}{2}$ " to $1\frac{1}{2}$ "	9"
2A	$1\frac{1}{2}$ " to $1\frac{1}{2}$ "	11"
3A	$1\frac{1}{2}$ " to $2\frac{1}{2}$ "	12 $\frac{1}{2}$ "
4A	$2\frac{1}{2}$ " to $3\frac{1}{2}$ "	20 $\frac{1}{2}$ "
5A	$3\frac{1}{2}$ " to $4\frac{1}{2}$ "	21"



## TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

Size No.	Range of Bores Taken	Length Overall
1X	$\frac{1}{2}$ " to $\frac{1}{2}$ "	5"
2X	$\frac{1}{2}$ " to $2\frac{1}{2}$ "	6"
3X	$2\frac{1}{2}$ " to $3\frac{1}{2}$ "	6"
60	$\frac{3}{4}$ " to $\frac{7}{8}$ "	8 $\frac{1}{4}$ "
0	$\frac{7}{8}$ " to $1\frac{1}{8}$ "	8 $\frac{1}{4}$ "
1	$1\frac{1}{8}$ " to $1\frac{1}{4}$ "	9"
2	$1\frac{1}{4}$ " to $1\frac{3}{4}$ "	11 $\frac{3}{4}$ "
3	$1\frac{3}{4}$ " to $2\frac{1}{4}$ "	13 $\frac{3}{4}$ "
4	$2\frac{1}{4}$ " to $2\frac{3}{4}$ "	17 $\frac{1}{4}$ "

(Other sizes taking up to 7" bores.)

**W. H. NICHOLSON & CO.**  
117 Oregon St., Wilkes-Barre, Pa.

—then it is a comparatively simple and economical operation to obtain the required concentricity with the outer dimensions, with much greater facility by locating from the correctly generated bore.

In the manufacture of gears, this is of prime importance since it permits use of blanks whose inner dimension is established in advance before the generating process or the work on the outer dimension begins. This practice assures that the gear teeth are generated concentric to the center of rotation of the blank and will not change in subsequent machining operations.

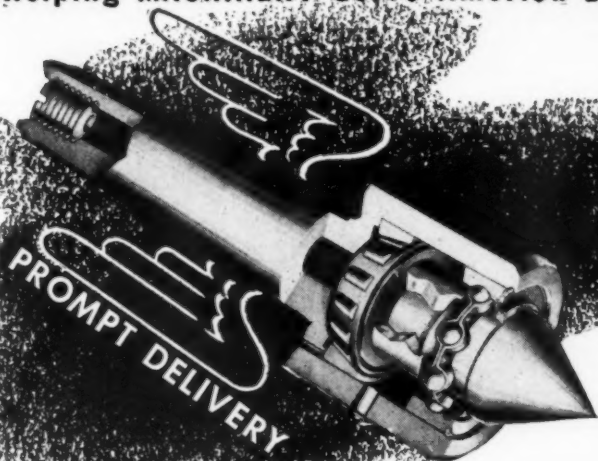
In connection with the development of automatic control for honing, there are two features which are important beyond the development of the process itself. The first is the means for adapting existing machines to use the new equipment thru installation of the automatic controls. This installation is expected to assist in the improvement of existing machines where it is not possible to obtain new ones and to enable the manufacturer to enjoy some of the advantages and benefits of "production" or "mass-precision" honing.

Another Micromatic development is a new treatment for vitreous-bonded honing sticks, whereby even when using a softer bond, it is possible for the abrasives in the honing stones to have a more effective cutting rate and to give deeper cuts and also longer life for the stones, since the treatment results in a "socket" rather than a "Tiffany" setting for the abrasive particles in the honing surface.

Prominent in the discussions of post-war manufacturing is the admitted necessity on the part of management to take advantage of every possible short-cut in manufacturing without sacrificing quality. Increased material and labor costs dominate all discussions of new machines, particularly automobiles. It is in line with this discussion that Micromatic Hone has announced its development, for it seems to offer a definite contribution to the problem of manufacture without sacrificing present or pre-war price levels for the ultimate consumer.

(Illustrations—Courtesy Micromatic Hone Co., Detroit.)

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Other IDEAL Machine Tool Products Include: 4-Jaw "Independent" Chuck (6"), Demagnetizers, Metal Etchers, Grinding Wheel Dressers, Balancing Ways, Dust Collectors, Electric Cleaners.

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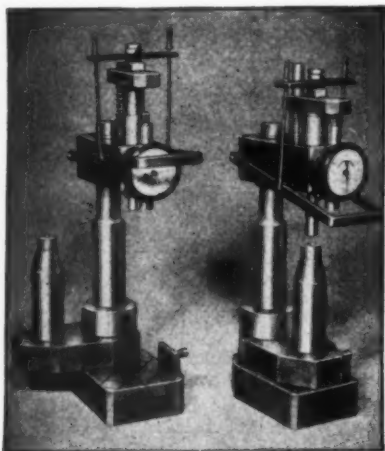


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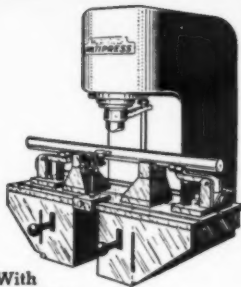
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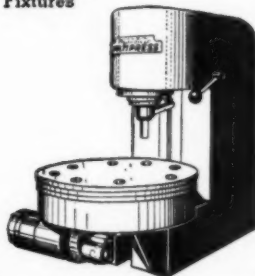
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 EQUIPMENT & APPLIED  
*Hydraulics*



# The ART of METAL Cutting

## PART IV.

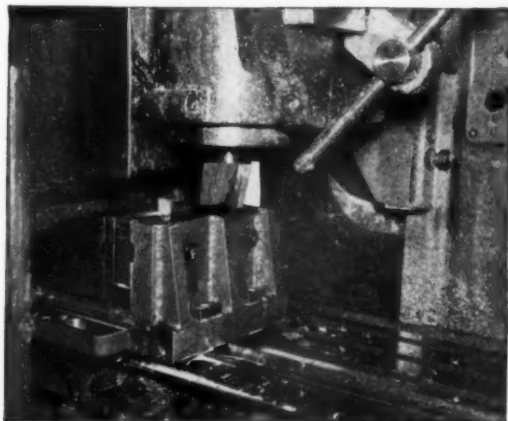
### MACHINING ALUMINUM AND NON-FERROUS MATERIALS

**T**HE application of carbide as a cutting metal for the machining of non-ferrous materials such as aluminum, bronze, brass, magnesium and plastics was successfully accomplished more than a decade ago. Development of carbides and above all, development of the technique of their use has resulted, in recent months, in constantly increasing rates of metal removal. No one actually knows what the upper limits of feed and speed for these non-ferrous materials eventually may be. At the moment, machine design alone is the limiting factor. Spindle

bearings cannot be designed to give satisfactory and continuous service at speeds above 10,000 rpm—at least for machines in which considerable cutting force is to be exerted at these extremely high speeds. But with these limitations, production has been sky-rocketed as much as ten %, or 10 pieces are being machined in the interval in which a single one was produced a few short months ago.

It may be of interest, however, to begin with some of the extremely hard non-ferrous materials that are so resistant

Material: 24 ST; SFM, 5070; feed rate, 100" min; cutter, 2 1/8" dia; 4 teeth.





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The Haskins Way**

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to cutting and machining generally. Among these is Aluminum bronze, which in a typical instance is a ring casting turned on a boring mill. Until recently, this casting could be machined only at speeds of around 60' per minute. Now it is being machined at 200 sfpm. A 5/16" depth of cut of this tough metal is removed at a feed of .001", all of which adds up to an increase in production of as much as three times.

A vital manganese bronze part is being milled currently in one-tenth the time formerly demanded by high speed cutters. To be specific, the present rate with carbide milling cutters is 820 sfpm and 20" of feed. The machining time is now eight seconds, whereas only a few short weeks ago this same operation required 1½ minutes.

An aluminum radio part is being straddle milled at 2000 sfpm and at a feed of 20" per minute. Formerly, this same part was milled with high speed cutters at 7" feed rate, which represents just a little under tripling production. In addition, 4800 pieces were milled between grinds of the carbide tipped cutter whereas only 100 pieces could be milled with high speed mills.

An aluminum casting is now being milled at 3400 sfpm and the rapid traverse rate of 75" per minute is used for the feed rate. With high speed cutters, 10 of these castings were milled per hour while now this has been increased to 125—representing a 12.5 times increase in the production rate. Moreover, with carbide cutters, the quality of the finish is vastly improved and this without benefit of coolant. Hence, the overall saving is more than that represented solely by increase in the number of pieces.

Dural is the aristocrat of the aluminum field and one of the top bracket materials of this war. More than 200 cubic inches of this metal, an alloy of aluminum and copper, are being removed on a planer type milling machine every minute. The speed of the cutter is 5250' per minute and the workpiece is being fed into the cutter at a rate of 22" per minute. This is all the more remarkable when it is



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## ★ BETTER because:

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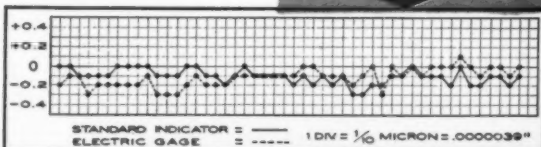
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Graph of impartial test by prominent gage user. STANDARD *Decimatic* repeatability checked against elaborate electric gage costing more than ten times as much. Note greatest difference in readings does not exceed 2/10 micron.

## A Convincing Comparison of Precision



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**CAPEWELL**  
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An Eastern warehouse, specializing in alloy steels including stainless, conducted their own tests of hack saw blades. On the basis of their records they selected and placed their orders for Capewell's tough *Technite* hack saw blades. Do you have a metalsawing job that requires tough blades? Then ask your mill supply house about Capewell's long-life hack saw blades.

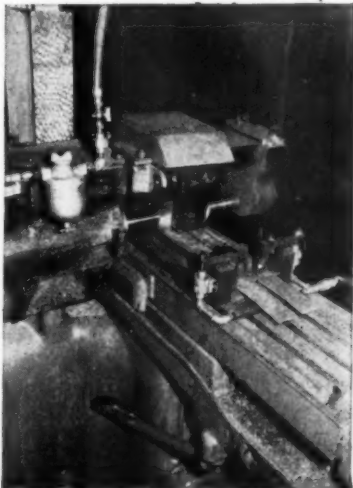


**THE CAPEWELL MFG. CO.**  
**Hartford, 2, Conn.**

noted that the cut has these dimensions:—  
 $3\frac{1}{2}$ " wide by 3" deep by 96" long.

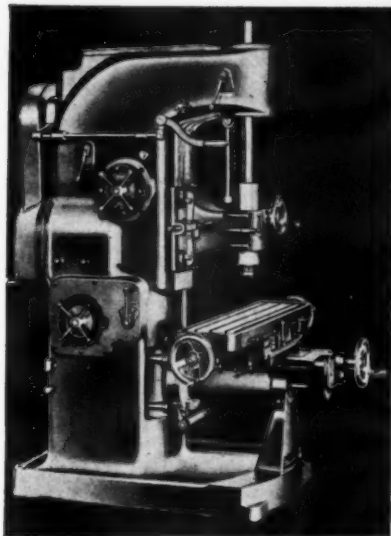
How has this miraculous production of airplanes been accomplished in this country? Because such parts as Dural sheets are being scarfed at 5740 sfpm, while the pieces are being fed into the cutter at the incredible rate of 150" per minute. This operation is being performed on the West Coast in one of the aircraft plants by means of a small cutter, only  $2\frac{1}{2}$ " in diameter. The spindle speed is 8000 rpm which is the equivalent of 5470 feet per minute.

Another 24 ST part, vital to the aircraft currently making history on the fighting fronts are being machined at 5070 feet per minute equivalent to 8500 rpm. And the feed rate with the Tungsten Carbide cutter is 100" per minute. Formerly, the surface foot rate was 1500' per minute; thus, more than a three-fold increase in production has resulted with this new technique.



Material: Asbestos Brake Lining; SFM, 5900; Feed, 225" min; cutter,  $2\frac{1}{2}$ " dia x 6"; teeth, 8.

# *The* **KNIGHT MILLER** **No.40**



## **Performs FIVE OPERATIONS AT ONE SETTING**

- **BORING**
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- **PROFILING**
- **KEYWAY CUTTING**

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The No. 40 has a wide range of capacity, fitting it for many jobs and uses. There are 16 different spindle speeds and 16 different table feeds. Whatever the job, you can handle it more profitably on a Knight Miller.

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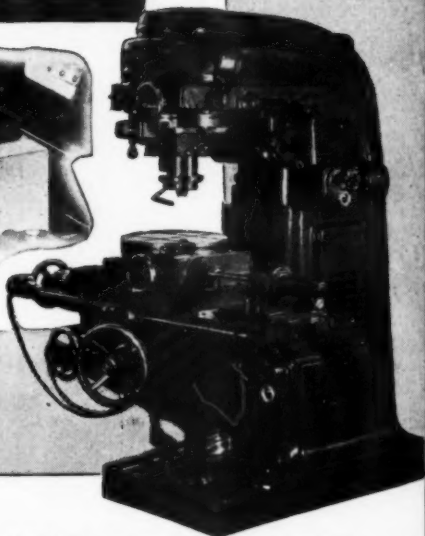
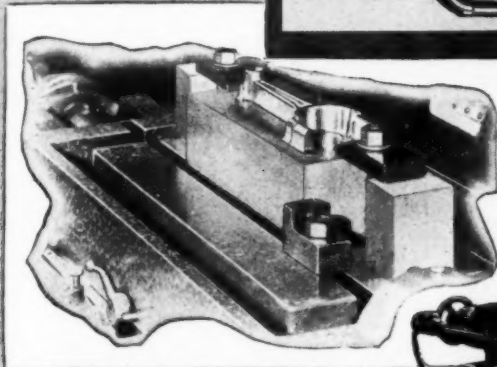
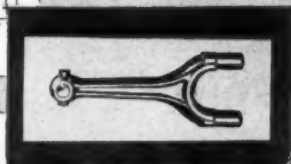
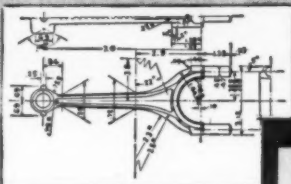
It is significant and noteworthy that these increases have been accomplished merely by a new and improved technique in the use of carbide. An individual with an inquisitiveness that could not be brushed off, set the pace. His experience until 1939 has been almost solely in the woodworking industry of the West Coast. With the outbreak of the war in Europe and the resultant stepping-up of industrial activity, particularly in the aircraft industry, this individual transferred to a small and struggling organization engaged in the manufacture of airplanes.

Immediately, he questioned the speeds and feeds used on such non-ferrous materials as aluminum. He could not be satisfied until experiments at speeds used in woodworking had been tried. Machine tools were rebuilt, spindle speeds stepped-up and feeds vastly increased. Some few changes were made in the angles used in carbide cutters and the manner of applying the carbide tips. Speeds went from 1500 sfpm to as high as 20,000' per minute, as we shall see directly. Some aircraft parts, not so sturdy and rigid, and of small cross section are being milled at 5000 to 10,000 fpm. But many of these same parts composed of hard, tough Dural of the 14 and 24 ST series are being milled at the 20,000 fpm rate. No production executive, using such techniques is prepared to say at the moment that this represents the upper limit beyond which we cannot go. The fact is that no one employing these methods and carbide tools has yet approached the limit of endurance of these tools. The only limiting feature at the moment lies within the machine tools themselves—the limits of spindle speeds, spindle bearing endurance, wearing qualities, etc. Some of these upper limit operations will now be briefly discussed.

An aluminum sand casting, a vital part in a fighter plane, is being milled currently at a cutter speed of 10,490 sfpm (a spindle speed of 5000 rpm since the cutter is 8" in diameter) and the feed is 75" per minute.

Another sand casting of aluminum is being machined with the aid of a 4" diam-

# How Many Hours Would You Need to Mill this Master Hob?



Speed, economy and accuracy are typical performance features of a Milwaukee Rotary Head Milling Machine. The milling operation on this master hob is an excellent example.

Read this job report —

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**ACCURATE** . . . chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements — possible only with this machine — transmits mathematical precision to the work.

**FAST** . . . initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

Write for Bulletin No. 1002C and complete information.

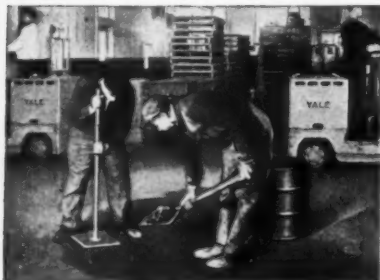
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Subsidiary of Kearney & Trecker Corporation

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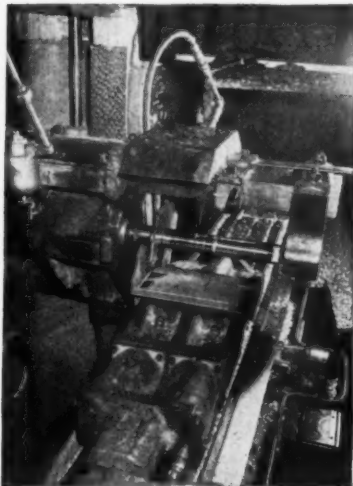
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eter cutter, carbide tipped, at 10,000 rpm spindle speed which is equal to a surface foot rate of 10,540 fpm. The workpiece is being fed into the cutter at a rate of 100" per minute. These operations represent an increase of production of a little less than 10 times. In other words, 10 of these parts are being processed today where only one was produced a short while ago.

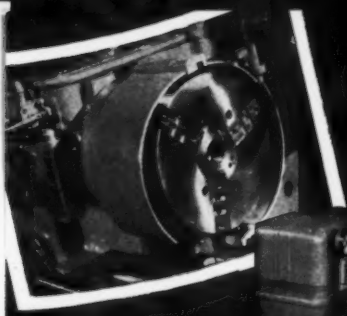
Dural rods are being sawed in two, lengthwise at a rate of 180" per minute and a speed rate of 9400 fpm. This is an increase of more than 12 times in production with carbide tipped saw blades as compared with high speed cutters.



Material, 14ST (Dural); 8" dia. cutter;  
10 teeth; 15000 SFM; 225" per minute  
feed rate.

Asbestos lining for brake drums is currently being scarfed or tapered at speeds of more than 10 times those in use a few months ago. Carbide cutters alone have the lasting qualities for this very abrasive material and at the same time are capable of speeding up the production program many fold.

One of the top notch jobs in the aircraft industry at the moment is the machining



# 5 ways

**Logan Hydraulic-Operated Chuck**  
*Reduces Machining Costs*  
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- 1 Reduces Chucking Time to Seconds
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Price \$50.00 in Stock.....F.O.B. Chicago

### PASSMAN BROTHERS

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of a Dural Part (24 ST) at the incredible speed of 18,900 sfpm while the workpiece is being fed into the cutter at the maximum rapid traverse rate, namely, 225" per minute. A few short months ago this same part would have been milled at 1200 sfpm. Thus, carbide has permitted an increase of more than eight times in the production of this part.

Magnesium is currently being machined with the aid of carbides at rates common in the woodworking industry. No one is prepared to say what the upper limit of machinability might be; certainly no one has yet approached that limit, whatever it may be. The consensus of expert opinion, at this writing, is that once bearing design has caught up with these techniques, speeds at least two or three times those that are now used will be common practice. Magnesium can be milled without fear of combustion, providing carbide cutters are used with the proper angles that will remove large chips. At no time must this material be removed in fine dust-like particles, which when exposed to the air may immediately burn.

Plastic materials belong to an even more mysterious bracket as regards machining-feeds and speeds. These materials that will assume such tremendous importance in the post-war era are more easily machined for the most part, than aluminum and magnesium. And since we are far from reaching the upper limits for the latter, the same probably holds for plastics and similar synthetic compositions.

Thus, we have accomplished an increase of more than 10 times in machining speeds for non-ferrous materials during the past 12 months. Nor is this the limit.

These discussions have revolved around war material, and the effect on the war effort, alone. However, no one can fail to see the profound influence of this evolution upon our whole industrial, economic and social structure. Automobiles, vacuum cleaners, refrigerators and the innumerable articles demanded by peace-time American consumers will be produced better, more efficiently, under better working conditions and, of course, at far lower costs because this Archimedes lever is at last being applied to the raising of the rate of producing wealth.





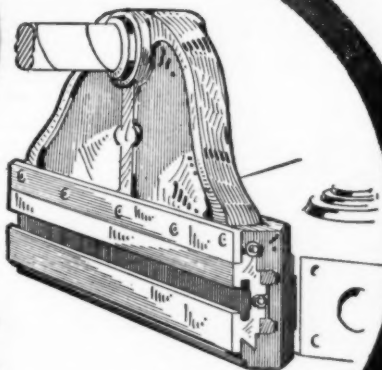
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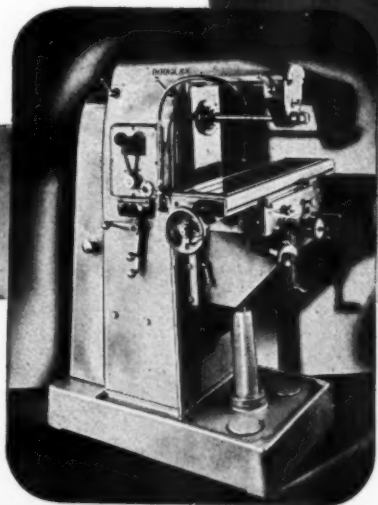
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# *Trends* ON THE PRODUCTION FRONT

## HIGHER SPEEDS

**T**HE necessity for high speed spindles in machine tools has taken new significance with the advent of high speed milling of such non-ferrous materials as aluminum, magnesium and the plastics. The aircraft industry, particularly on the West Coast where this technique had its inception, is currently using spindle speeds of 10,000 rpm or surface foot rates as high as 20,000 fpm. (With an 8" diameter cutter, and a spindle speed of 10,000 rpm, the sfpm is actually over this rate, which a few years ago would have been considered "astronomical").

What is more, this same industry is clamoring for higher speeds. Three years ago, when carbides were applied to the milling of aluminum, the first specially engineered and constructed heads were built for a spindle speed of 15,000. However, with 15 hp motors and attendant high torques, bearing troubles became so pronounced that it was necessary to restrict the speed to a maximum of 10,000. Even at this reduced rate, bearing temperatures had to be controlled with

thermostatically controlled circulating water cooling systems.

High speeds alone in spindles cause no trouble and have been used in the wood-working industry for many decades. But in combination with high torques, relatively speaking, overheating and seizure troubles begin to appear. No one knows the upper limit of speeds for the machining of non-ferrous materials such as aluminum, magnesium and the plastics. The common complaint among production specialists in these metals is that the current rates (10,000 rpm) are far too low. With the heavy cuts that are and will be taken in these materials, the hp requirements, and the corresponding torques will, therefore require an entirely new approach to bearing design and manufacture.

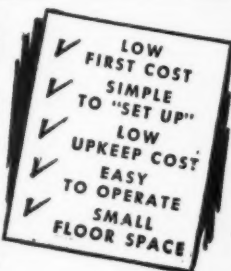
There are definite indications that tungsten carbide may help solve this problem. What work has been done—(and much has been impossible because of war demands)—indicates the suitability of these hard materials for bearing purposes. The frictional coefficients are much lower than for other materials and the



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BORING AND FACING TOOL HEAD

inherent characteristics (such as hardness and heat conductivity) indicate, even from purely theoretical considerations, that this is an ideal bearing material.

Steel (journals) in carbide bearings is one possible combination, with both journal and bearing of carbide as an even better specification.

Tests now under way and others contemplated will shortly provide the answer not only for traditional bearings but also the possible use of carbide as ways in machine tools where scoring and even ordinary wear prevent accurate functioning and result in considerable down-time as well as increased maintenance costs.

Fortunately, the economics of carbide favor this latest possible application. The price per pound is now sufficiently low (at this writing about \$15.00 per pound as compared with more than \$400 per pound when carbides were introduced in 1928) so that such applications as here indicated are feasible as regards cost if the engineering and technical considerations are favorable.

## MILLING CUTTER DESIGN

**T**HIS brief reference to one phase of cutter design is not intended as, or pretended to be comprehensive. It is a reference in passing, to one of the specifications of multi-tooth cutters about which there is considerable discussion. Particularly so at the moment with the growing interest in, and increasing popularity of carbide milling techniques. This method which is considered one of the outstanding contributions of the present war is calling for an entirely new design of this tool as used in milling.

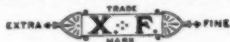
Because of the nature of carbide, it is necessary to operate carbide milling cutters for steel at much higher surface foot rates than were previously considered good practice. Where 50 to 100' per minute has been customary in the past with high speed cutters, it is now necessary to operate carbide cutters at rates ranging from 350 to 750' per minute. This is a result of the inherent nature of carbide and need not detain us here. It may be well however to emphasize the necessity for



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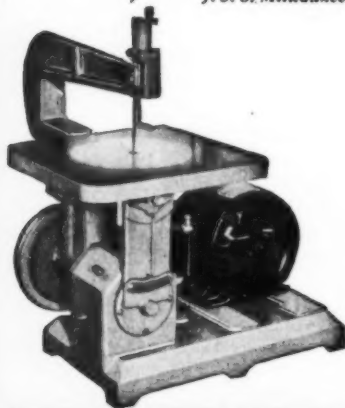
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these higher speeds, based on the very nature and demands of the carbide as a cutting material. These relatively high surface foot rates are **not** the result of a speed mania or due to the mere whim of some mass production enthusiasts.

Sufficient for our present purpose is the necessity for these high rates. Added to this fact is another, namely, the necessity for heavy chip loads or the taking of a good "bite" by each tooth. (Chip Load is the amount of metal removed by one tooth in making one revolution thru the work). Formerly, with High Speed milling cutters, chip loads of two or three thousandths—not higher than 10 thousandths—was the better part of good practice. Now, however, five thousandths is considered as the minimum and 10 thousandths as an average "bite", going higher if power is available. This is necessary for economical cutter or tip life.

And this brings up the problem of tooth pitch in the design of milling cutters. The limiting factor in carbide steel milling is, all too frequently, the power available. The feed rate, and therefore, almost in exact ratio the power, are dependent upon the chip load, (the number of teeth and the "revs" of these teeth). The first two of these factors must necessarily be high, namely the sfm and the Chip Load, and it follows obviously, that the feed rate will be high. The feed rate will be abnormally high if the traditional number of teeth are used in the cutter design. By traditional we mean, the number of teeth usually specified in high speed cutters. Thus, an 8" hs cutter traditionally has 18 to 22 teeth. If with this fine pitch we used a high sfm and a large chip load, the feed rate and power consumption would not only be high, but out of all reason and proportion. Hence it has been customary, in the limited practice to date in carbide steel milling, to limit the number of teeth in a cutter to D or D plus 2 or D minus 2—D being the diameter of the cutter. Thus an 8" cutter has a number of teeth ranging from 6 to 10, with the average as 8. Moreover, this has been found in practice to be a pitch efficiently applicable to a large variety of jobs. The only exception is a mass production operation that will



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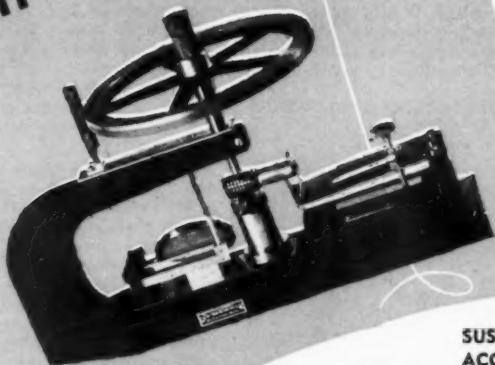
There are those who recommend the use of a formula for the determination of the number of teeth in a cutter, basing this on the hp available in the machine. The formula is a simple outgrowth of the fact that the number of cubic inches of metal removed per minute has a definite relation to the hp required. In the milling of steel, from 1/2 to 1½ hp per cubic inch of metal removed is required. This factor varies with the machine, its condition, the nature of the steel being milled and above all, the nature of the job itself—its inherent rigidity, etc.

Is it practical to use a formula to determine the number of teeth required for each job to be milled? Obviously not unless a cutter is to be manufactured for each job as it presents itself. Excepting a few organizations, the cutter will be purchased from a reputable cutter manufacturer who, for economy reasons, is forced to standardize on the tooth pitch. This standardization, if it can be called that, has up to the moment taken the form of the D formula or better rule-of-the-thumb. Since this is based on experience, however limited and necessarily so in view of the recent beginnings of this technique, it will be found to meet the average situation quite well. That is an average of D number of teeth will be found to limit the feed rate, and therefore, the power, to a fairly reasonable figure, even using a 10 thousandths chip load. If this pitch is too large, then a smaller chip load must be taken or the depth of cut reduced.

In any given milling job, the limitations are obvious:—the width of cut cannot be reduced nor can the power available in a given machine, here and now, be altered. The depth of cut, and Chip Load however can be changed to conform to the power available in the machine.

The power required to mill a given piece depends on the cubic inches of metal removed per minute. Hence the width (W) times the depth (D) times the feed rate (Chip load times the No. of teeth times the rpm) are the governing factors. Of these, as noted, it is prac-

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tical usually to change the depth of cut, the Chip Load and within limits the rpm. All of these can be reduced to result in a smaller feed rate with which the power demands keep in step or almost nearly so.

But it is not practical to change the number of teeth nor is it possible to change the width of cut; particularly the number of teeth. These have been built into a cutter which is sold to the trade on the basis of its being a "standard"; this is the basis for a reasonable charge for a cutter. Any other approach means

a "special" and this results in a prohibitive cost.

Hence in approaching a milling operation with carbide it is best to consider the probable power demands by making a few simple calculations: Multiply the width of the cut by the depth and this by the feed rate. The feed rate is determined by multiplying the Chip Load (start with 7 or 8 thousandths) by the number of teeth in the cutter available and this result by the rpm selected arbitrarily on this basis: for high BHN's use lower sfm's and for the lower BHN's use the higher sfm rates.

Example:—The cutter has 10 teeth (8" dia.); C.L. selected is .008" and the sfm is 400 which, with an 8" cutter results in approximately 200 rpm. Multiplying these as suggested, results in a 16" feed rate. Suppose further that a 2" wide cut, .100" deep is to be taken. Under these conditions the hp required will be  $2 \times .100 \times 16$  or 3.2 cubic inches per minute. This will probably require 5 hp on the average machine. If 5 hp is not available, then a .050" deep cut can be taken or the .008" Chip Load reduced to .005". Either or both of these reductions will help to bring the operation to within the hp available. Obviously these are simpler changes than either calculating the number of teeth based on the hp in the machine, or changing the number of teeth to bring the feed rate within the limits of the power that is available.

There is one more consideration militating against the change of tooth pitch or calculating same. It is possible to calcu-



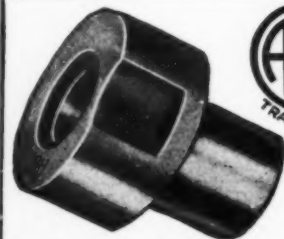
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late the number of teeth based on this formula:—No. of Teeth equals  $W. \times D \times rpm \times C.L. \times Factor$  divided into the hp of the machine where D equals depth of cut, W equals width of cut, rpm equals the spindle speed, C.L. equals the chip load and Factor equals the hp required to mill a cubic inch of metal per minute on the machine designated for this particular job. Since the Factor varies with the condition of the machine and other variables it must, or should be determined for each machine and, as a matter of fact, for each job, or at least class of job.

The pitch (so calculated) might well be wrong for another very important reason. It could easily result in a pitch too fine for the job in question. Thus, if the space between teeth is not sufficient to accommodate the chips, these will wedge between the workpiece surface being milled and the carbide teeth to the detriment and even destruction of the latter.

On the other hand, it has been found by experience that using D as the number of teeth (or D plus 2 or minus 2) the power requirements are or can be made to meet the machine power available and the space between teeth is such that optimum cutter life will result from the ample chip accommodation space between teeth.

It is not practical to calculate the number of teeth required in a cutter for a particular job basing the calculation on the width, depth, C.L., rpm, and the hp in the machine.

It is practical, however, to proceed as indicated namely, reducing the C.L. or the depth of cut or both, using the cutter, whatever its pitch, that is available.

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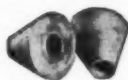
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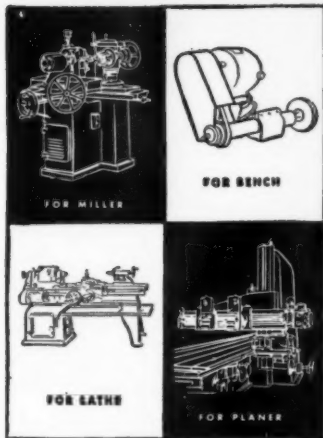
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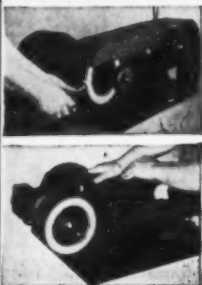
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Works better than set-up wheel for polishing.

**WRITE TODAY FOR COMPLETE INFORMATION  
ABOUT THIS TIME AND MONEY-SAVING TOOL!**



**PORTER-CABLE Machine Co.** 300-2 Exchange St.  
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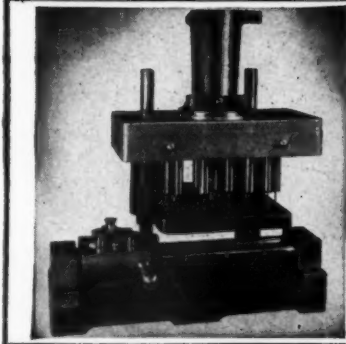
# *A good example* OF HOW AND WHY THE *Ettco-Emrick* MULTIPLE HEAD SYSTEM assures fast production on small parts drilling and tapping

**THE JOB**—Shown actual size. Material, SAE 1010 steel,  $\frac{1}{4}$ " thick. 16 holes to be drilled and tapped—9 for No. 6-40 pitch; 4 for No. 10-32 p.; 3 for No. 10-24 p. Note the closeness of center distances.

Illustrations below show how fast production is obtained with the combination multiple drilling and tapping head and sliding carriage fixture—one of the many adaptations of the Ettco-Emrick Multiple Head System.



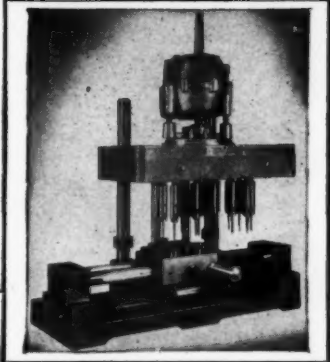
## DRILLING



This is the combination equipment arranged for the drilling. Carriage is in loading position. Operator simply places part as shown. Accurate location and clamping is done automatically as carriage is moved to the first of the 3 drilling positions. Release is also automatic. Precise location at each station is assured by a locating rod at the back which engages a bushed hole in the carriage as the drilling head is lowered. Numbers on part above, indicate holes drilled at each position.

**BEFORE** you decide on how to multiple drill or tap any small part, send a drawing or sample with essential data to Ettco-Emrick for recommendations. Engineers of many of the biggest firms in the country are doing this right along because they have learned it pays.

## TAPPING



After the required quantity of parts has been drilled, the equipment is set up for tapping by simply removing the drilling face plate, bushing plate and drills, and mounting the tapping head driving unit and required adapter and tap units—a matter of minutes. Order of tapping holes at each station is the same as in drilling. With two separate heads, one for drilling and one for tapping, practically any required volume could be obtained.

## ETTCO TOOL CO.

596 Johnson Ave., Brooklyn 6, N. Y.

*Over 25 years specialization in solving  
Industry's drilling and tapping problems*

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**A Definitely Better Product**

Into the manufacture of Chicago "SAFETY PLUS" Products goes all of the ingenuity acquired in 73 years of experience in the production of the finest threaded products.

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*These Fine Products are sold only thru Authorized Distributors.*



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Supplied to order in required sizes and accuracies  
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# THE FOREMANSHIP FORUM

By Edmund Mottershead

## THE DYNAMIC SIDE OF FOREMANSHIP

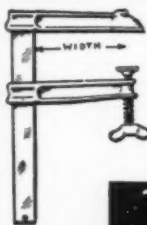
**T**HE dynamic phase of the foreman's job is the ever-present problem of dealing with people. Far too many foremen have high technical and executive ability and relegate the problems of human relationships to the backs of their minds, or worse, shove it off onto the shoulders of the personnel or industrial relations departments. The foreman must strive to develop and maintain morale and discipline in his department; must obtain cooperation, not only from his workers but from other foremen and from his superiors as well. Friendliness, loyalty, fairness, appreciation of others, control of his own temper, openmindedness, and many other qualities of leadership are prime requisites of his successful handling of the job.

The dynamic side of his work has three main elements. First he should have a thoro knowledge of people and their motivations. Second, he should understand the use of definite strategies of human

relations. Third is the long pull supervision which in terms of human relations means leadership. But before examining these three elements in detail, let's consider just a few of the many reasons why some foremen fail to appreciate the human values in connection with their jobs. Let's consider some types:

**Conceit**—Often you'll encounter a foreman who has not just a good opinion of himself, but the plain garden variety of big-head. Some men just cannot stand prosperity. Possibly few men could boss others around the way he could. He was the BOSS and no mistake. (He didn't get along very well!)

**Outside interests**—He was a good fellow . . . very definitely hail and well met. Everybody liked him. Even his wife. (And three or four other fellows' wives). And all the barkeeps in town. He was a good bowler and the plant ball team is going to miss him at third base. Being precinct



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A complete line of five widths: 2" to 7".

An unlimited variety of lengths.

Sturdy — Handy — Durable.

High grade Steel and Malleable Iron.

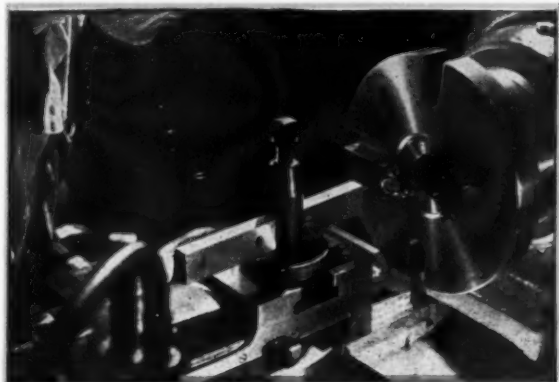
Acme Thread Spindle.

For Welding jobs: Special type with spatter-proof spindles.

**THE WETZLER CLAMP CO.**

43-15-11TH STREET, LONG ISLAND CITY 1, N. Y.

Many mechanical tests of established worth are applied to each *Henley* LATHE while it is being run off in the inspection department. These two illustrations with a brief description of each show a characteristic group of two such tests, of which there are many others of equal importance.



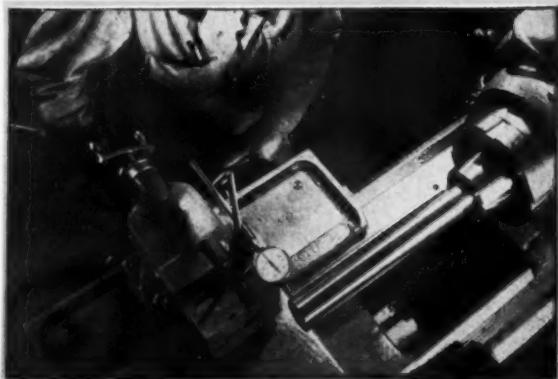
*Testing taper hole in spindle for true running. Must register zero on indicator.*

Each and every test when made has to be approved in its determination by the chief inspector before the lathe being tested is released for shipment.

## **- 1874 -**

71 years of continuous application to the manufacturing of machinery and machine tools of high standards.

## **- 1945 -**



*Testing alignment of spindle with ways of bed; also showing that taper hole in spindle is in perfect alignment.*

**THE HENLEY MACHINE COMPANY, TORRINGTON, CONN.**  
**Boston      New York      Rochester      Chicago      Detroit**

committeeman, he made a natural block captain for the OCD, when they could find him. So he was retired to take care of his outside interests. The company executives decided they wanted to use the telephone even during his working hours.

**Excitability**—Not that he hated anybody in particular, but when something went wrong, you could hear him a block the other side of the railroad tracks. He ran around with a pocket full of scraps of paper he used to make notes so he wouldn't forget things and then couldn't find the papers until his wife cleaned out his pockets at the end of the week. The army turned him down for emotional instability.

**Irresponsibility**—He wasn't exactly a buck passer, but it was always someone else's fault when things went wrong. After all the men in his own department had taken the blame for everything, he went to work on the other foremen. They couldn't all be responsible for his department; so the company got a man who would take the responsibility and give

everybody a rest. The irresponsible one obtained a position in another firm . . . where he's still trying to pin the blame on others.

**Ambitions . . . for himself only**—And outspoken about it. If this fellow didn't blow his own horn, nobody else would. A fellow had to look out for "number one" because nobody else would. He apparently couldn't, and after he had said so, so many times, they didn't. Departmental politics turned out to be bad business when Army Ordnance wanted results instead of excuses. He's still working for himself, only he's his own boss now.

**Lack of tact in the front office**—The "super" (who by the way had graduated from the same department) didn't know anything about anything any more. Times had changed. When he had a beef, he went right to the top; that was the only way to get results. If the personnel department couldn't pick men for him any better, he's going out and get them himself. Those guys up front don't do anything all day long but warm the chairs anyway; so they ought to have plenty



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Morse taper 2's and 3's.....	\$20.00 each
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**Tracer Controlled  
PANTOGRAPH  
Saves Critical  
MAN HOURS**

Typical HIGH PRODUCTION JOB  
for 1000 HP. Diesel Engines

## IRREGULAR PORTS MILLED in ROTARY

This manufacturer solved the difficulties involved in milling irregular shapes in cylindrical parts by placing the job on a Gorton Tracer-Controlled Pantograph, equipped with a Gorton Roll Attachment, enabling use of only a simple, FLAT Master.

Specifications called for cutting highly finished ports in these Rotary Valves of nickel steel tubing, 7/32" thick. The required rough, semi-finish and finish cuts were completed in 30 minutes per Valve, Floor-to-Floor Time. Port was first roughed with 1/4" dia. 4-flute spiral end mill. For the semi-finish operation, tracer and cutter were changed to 1/8" dia. Finish cut necessitated only a change in tracer style. To prevent chatter marks and insure the fine finish demanded, only .002" to .003" of stock was removed in the finishing cut.

**GORTON ENGINEERING SERVICE, FREE.** Submit your milling problems like these to Gorton Engineers. Use their long experience in Tracer-Control Milling to solve your problems—recommendations made without charge or obligation. Send part or print to nearest Gorton Dealer, or direct to the Gorton Factory at Racine, Wis.

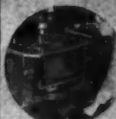
## VALVES . . . in 30 Min. Each

Gorton Tracer-Controlled Machines simplify difficult operations like this, because they are quickly set up, and easily operated by less skilled labor than by other methods. Tracer-Control assures uniform accuracy. Tracer-Control Roll Attachment permits milling or engraving of continuous designs, completely around rolls, tubes, etc. For further information, send for both Bulletins offered below.

### JOB IN BRIEF . . .

- PART**—Valve.
- OPERATION**—Rough, Semi-Finish and Finish Milling of irregular-shaped port in Valve.
- MATERIAL**—Gorton Roll Attachment 750-1.
- ATTACHMENT**—Gorton Roll Attachment 750-1.
- EXTERS**—1/4" and 1/8" four-flute, spiral, end mills.
- MATERIAL**—Nickel Steel tubing, 7/32" wall thickness.
- PRODUCTION**—30 minutes per Valve, Floor-to-Floor.
- FINISH**—Exceptionally smooth.

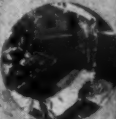
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for Every Job . . .  
From 1 in. to 2 ft  
and 1000 HP



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of time to listen to him. Nobody knows who is listening to him now; maybe his wife.

**Lack of self-confidence**—He wanted to be friends but didn't quite know how. Some of the tough boys started to ride him, and then the whole gang was doing it. He thought they were all against him and didn't know what to do about it. The "super" was after him because production was down, and he was afraid to open his mouth to anybody to try to speed up things. He wasn't too sure of all the technical details of the work in the department, and was afraid he'd lose face if he admitted as much; so he tried to bluff his way thru it. This only made things worse; so the gang rode him worse than ever. He quit.

**Inability to handle men**—He had plenty of confidence and knew his stuff all right in every way. So much so that he personally supervised and inspected about everything that happened in the place. Somebody cracked off that he was fussier than an old maid in a kitchen. So they

tagged him "Lady". He also had a temper, just to help things along. And was a strong believer in the old motto about doing things yourself if you want them done right. It probably never occurred to him that several of the men under him could perhaps do their jobs if he didn't bother them . . . might even do better with a little praise and trust in their ability. They shifted him over to chief inspector. Now he's happy making things tough for the assembly line.

Most if not all of these mistakes could have been avoided if in the first place the foremen had a little fundamental understanding of people, of their basic desires and motives. Professor Harry Overstreet in his book, "Influencing Human Behavior" says, "Action springs out of what we fundamentally desire . . . and the best piece of advice which can be given to would-be persuaders, whether in business, in the home . . . in politics or factory . . . is to first arouse in the other person an eager want. He who can do this has the whole world with him. He who cannot, walks a lonely way!"

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### ANGLE & RADIUS DRESSER

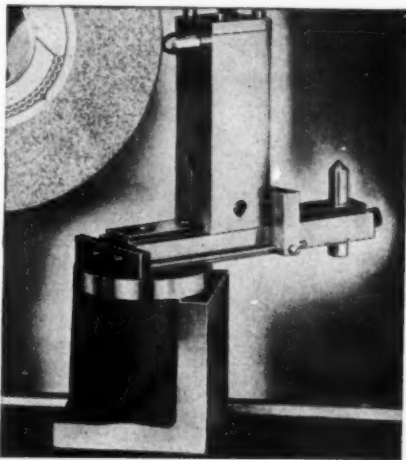
A sturdy, quality instrument designed by form-grinding specialists to dress both angles and radius at low cost. Two 1/3 ct. diamonds and instrument case included — \$150.00 complete.

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**ROTARY FILES** solve many a production-line problem of cleaning or smoothing out hard-to-get-at corners or surfaces. Dove-tail surfaces (as above), for instance. Here a Nicholson Inverted Cone Shape Rotary File with *Ground* teeth makes the operation simple and speedy.

**16 NICHOLSON STANDARD ROTARY FILE SHAPES**

*in both Hand Cut and Ground types*

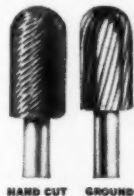
Cylindrical Flat End	Ball	Inverted Cone
Cylindrical Radius End	Oval	Cone 60° Included Angle
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Tree Shape Pointed End	Flame	Concave Type I
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*Cuts — COARSE, MEDIUM, FINE. Diameters — 1/8" to 2"*

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and for any desired special information. For deliveries, consult your mill-supply house.



**NICHOLSON ROTARY FILES**

**HAND CUT AND GROUND • FOR EVERY PURPOSE**

**NICHOLSON  
U.S.A.**

Dale Carnegie says—"If you want to gather honey, don't kick over the bee hive. "If you want to stir up resentment today that will kick back at you a month or six months from now, allow yourself to make unjust or stinging criticisms, be sarcastic, dogmatic, "bossy". What people want is a reasonable, sympathetic, understanding approach. Emerson said—"Every man I meet is my superior in some way. In that, I learn from him." If it could be true of Emerson, why doesn't it apply to you and me. Try to figure out the other fellow's good points for a change, and be lavish in your praise . . . not insincere flattery, but simple and sincere appreciation of the other people's good points.

The surest way on earth to influence the other fellow is to talk about what he wants and show him how to get it. That's the big secret. What do people want? Few of us really are satisfied with our lives. All of us have strong cravings for certain satisfactions. These desires are our basic motives. In the language of the

psychologist, there are five basic types of motives:— 1—Self preservation; 2—The desire for recognition, or the power complex; 3—Identification; 4—Projection; 5—Rationalization.

**1—Self Preservation.** This basic motive is expressed in many ways. Surveys have revealed that the primary interest of the average adult is in his or her own health . . . just let anyone start talking about himself, and that will come out. This motive is also indicated in one's interest in the health and well-being of one's family and friends; in the sex urge, in mating, love of family, etc. It is behind the desire for economic security, and as such is the root of most of our economic striving.

**2—Desire for recognition or power.** Psychologists tell us that man developed intelligence thru the ages as he developed means of dominating his environment. The first great step was when he learned to use his hands to manipulate things instead of for walking. The next step was

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### ANGLE-DRILL PRESS-PRODUCTION VISES



No. 000  
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**ANGLE VISES**—For Milling, Drilling, Grinding, Filing, Fitting, etc. Solve difficult angle jobs. Quick accurate set-ups without clamps, wedges or make-shift methods. Accurately machined and graduated. Hardened steel jaws, plain or grooved.  $1\frac{1}{2}$ " to 8".

**DRILL PRESS VISES**—Accurately machined. Best semi-steel castings. Long bearing and adjusting screw. Jaws hardened steel—plain or grooved. Sizes  $1\frac{1}{2}$ " to 4".

**MILLING ATTACHMENT VISE**—Just the fixture for milling operations on lathes. Fits 8"-9"-10" South Bend, Atlas, Craftsman, Sheldon, etc. Graduated vertical feed screw and 360° graduation for vertical angle adjustments. Mounts on cross slide and held by T-slot bolt. Vise has  $2\frac{1}{2}$ " jaws 1-7/16" deep grooved and plain. \$24.75.

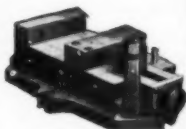
**HEAVY DUTY PRODUCTION VISES**—For fast, heavy work. Adjustable cam locking lever. Movable jaw, hardened and ground. Sizes 3" to 8" Jaws.

**FLANGED MILLING MACHINE VISE**—Clamps to table of milling machine, grinder, etc. Jaws hardened and ground. 6" wide, 2" deep.

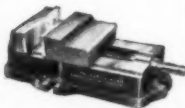
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Mfrs. of Palmgren Products for Over 25 Years  
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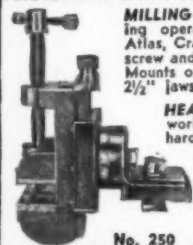
HEAVY DUTY  
PRODUCTION VISE



FLANGED MILLING  
MACHINE VISE



DRILL PRESS VISE



No. 250  
MILLING ATTACHMENT  
VISE— $2\frac{1}{2}$ " JAWS

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Solid!*

*Through* AND *Through*

Bath Quality is far deeper than surface finish. It includes steel selection, scientific hardening and precision workmanship. That's why Bath Taps and Gages are recognized everywhere as the standard of quality. It explains why Bath Taps lead in the speedy, dependable production of accurate threads . . . why Bath Gages are favored where there must be no compromise with precision.

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WORCESTER

MASS.

his power of speech. Watch children develop, and you will see the process recapitulated. They are curious. They want to do things. They demand attention, and howl for it when all else fails. Adults unconsciously are much the same. They want recognition, appreciation, the sense of power and ability, perhaps even more than the sense of security.

**3—Identification.** This is the process of bolstering up the ego by vicariously identifying yourself with other people or groups or ideals that you admire. The small boy indulges in hero worship—"I'll get my big brother", etc., the point being that he makes himself feel strong and confident because his brother is larger and stronger and in his mind is identified with himself. "Masons are wonderful people. I am a Mason, ergo:—I am wonderful also." Identification accounts for the group structures of society, for labor and management groups, for trade associations, for such things as tastes in clothes, brand-buying habits, etc. It is the basis of team spirit.

**4—Projection.** This is in essence the business of bolstering up the ego by pointing out faults in everyone else and thus making yourself feel important. It is inherent in the process of pointing out that President Roosevelt's formula for making coffee from old grounds during coffee rationing was something you had been doing for years; hence, he's no smarter than you are; consequently you're a smart fellow too. Projection underlies the interest we take in the scandals in the tabloid sheets, trying to tear down the reputations of noted people to make ourselves feel virtuous and important.

**5—Rationalization.** This is the process of making life around us reasonable to ourselves. It is a process which goes on continually, whether logically accurate or not. It includes at one extreme the fellow who "rationalizes" his drunkenness by saying he had to do it with the boys to be one of them, and at the other extreme, the most careful scientific hypotheses trying to explain some physical or chemical phenomenon. Because of this motive

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**FOR LATHES  
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These tools embody various locking designs. In some, the bits are held in mated serrations; in others, round-shank bits are locked in a drop seat. In others, the locks are different still. The bodies, or holders, are made of drop-forged alloy steel and the bits may be had in high speed steel or tungsten carbide tipped.



## FREE—New Booklet Showing How To Grind Milling Cutters

This useful booklet is a complete treatise on the grinding of milling cutters. Simply told, profusely illustrated. Send for it now.

**THE OK TOOL CO.,  
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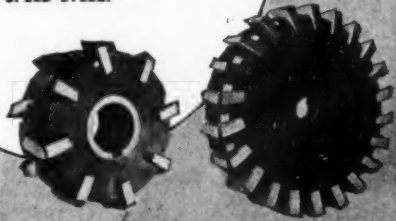
For extra speed and economy, replace old-style solid milling cutters and lathe, planer and shaper tools, with these modern designs. There is an O K Tool for every metal-cutting need, with a wide assortment of standard bits and blades, and innumerable special shapes to order.

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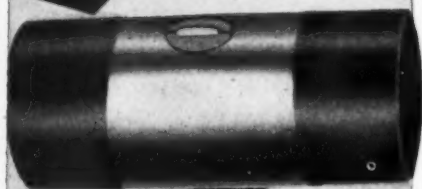
**BORING HEADS  
COUNTERBORES  
FACE MILLS  
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REAMERS**



As in the Single Point Tools, the blades of O K Milling Cutters are separate cutting units, the bodies are drop-forged alloy steel. The blades are driven into serrated mating slots. There they lock automatically and positively without pins, wedges or set screws; yet they are instantly adjustable in line of wear. All O K Tools SAVE HIGH SPEED STEEL!



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3 sizes and 7 weights  
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EVERYWHERE; write for name of  
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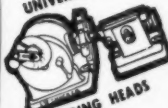
MILLING MACHINE VISES



LATHE CHUCKS



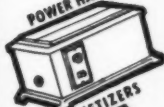
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Rectifiers  
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Standard magnetic chucks  
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Size 4 1/2" x 1 1/2"	Weight 6 lbs.
Size 3" x 1 1/2"	Weight 3 lbs.
Size 1 1/2" x 1 1/2"	Weight 1 lb.

## L-W CHUCK COMPANY

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**UNIQUE SHAPES** — For the marine, also up to 1/2" in diameter, only in one size (also including TV, the band with a bottom).

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**GRINDING WHEELS  
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**TRY ONE FREE** — A Chicago Mounted Wheel or an FV Bond Grinding Wheel sent promptly on request. Tell us size preferred and what you have to grind.

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HB-2

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Illustrated  
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A model and  
conforming  
brackets for  
all types of  
machines -



**LARGE  
and  
SMALL**

## DRIVE-ALL DRIVES THEM ALL

Heavy Duty machines require strong, rigid, mounting brackets, plus simple adjustability, to provide positive speed and power control.

DRIVE-ALL heavy duty mountings include two square bars, full length T-slotted motor and transmission brackets, sturdy round column and strong wide-gripping base mounting.

DRIVE-ALL heavy duty assembly is absolutely rigid and provides every mounting requirement for large machines as illustrated.

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### American H-2-30 STANDARD BROACHING MACHINE ADAPTED TO MANY "SPECIAL" JOBS!

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The set-up for one such job is illustrated at the right: To broach rectangular holes in aircraft bearing cages. Two opposite holes are broached at each pass. Starting with a drilled hole, three passes, each with a slightly larger broach, are required for each hole. Exceptional finish at a high production rate is assured.

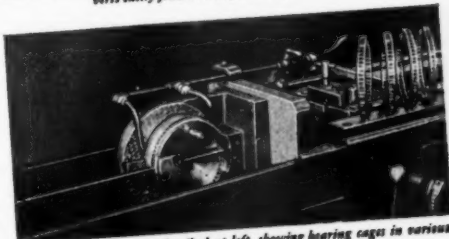
American's complete broaching service—machines, tools, and engineering—is available to speed your production. Let American engineers help solve your precision manufacturing problems with standard machinery that will save you valuable time and money. Write for further details.



Use proper and sufficient lubrication when broaching. It is cheap life insurance for broaching tools.



ABOVE: Standard American H-2-30 Horizontal Broaching Machine reconverts easily from war to post-war production.



Close-up view of set-up described at left, showing bearing cages in various stages of completion.

AMERICAN  
BROACHING TOOL  
INSTITUTE

*American*  
**BROACH AND  
MACHINE CO.**

ANN ARBOR, MICHIGAN  
BROACHING MACHINES  
PRESSES  
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## SUPREME Brand

Hard Edge Flexible Back Metal Cutting  
**BAND SAWS**



Have you been bothered with frequent band saw blade breakage, soft cutting edges, uneven set, or lack of proper temper?

If so, put an end to such trouble by using SUPREME METAL CUTTING BAND SAW BLADES.

Available in continuous bands for any machine or in coil form for radius or pattern cutting machines. All sizes permitted by WPB. When ordered in 100' lengths, coils are packed in handy containers.

Send for complete illustrated folder.

**The Saw & Knife Specialty Co., Inc.**  
6523 Carnegie Ave., Cleveland 3, Ohio

## MILLING - DRILLING - BORING ATTACHMENT for Heavy Duty Operations



### Easy Mounting

**Large Quill —**  
4" travel  
counter balanced,  
hardened, and  
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**6 speeds**  
250 - 3000 RPM  
Lever and Worm  
Feeds  
**1/2 H.P. Motor**

Specially engineered by  
RUSNOK to meet the  
demand for heavier duty  
end mill operations.  
Uses many types of  
a wide range of work.  
cutters on  
Large size spindle (No. 9 B & S  
taper). Takes 1/16" to 3/4" end  
mills. Precision Engineered and Ruggedly  
Constructed Throughout.

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**RUSNOK TOOL WORKS**  
4840 North Avenue, Chicago, Ill.

in all people, we must make our requests and our actions seem reasonable and sensible to them in the proper light; for otherwise they will find their own reasons to explain your actions.

In dealing with people, it is your first task to determine your own motives and objectives. It is your next task to determine THEIR objectives and motives and desires, so that you may understand them and talk to them from their points of view. In any specific instance of human contact, you should determine not only what motives in general exist in the people with whom you are dealing, and what specific motives you should appeal to at the moment. Remember, that to be a leader and get action from people, you have to make them want to do it for you.

The second element in the dynamic phase of the foreman's job is the use of definite techniques or strategies in dealing with people. Most of these techniques spring directly from an understanding of the basic motives of people, and from specific appeals to these motives, but there are a few special techniques worth mentioning briefly:


The assumptive technique—The foreman who simply assumes he is boss without making any particular effort to demonstrate his authority, will get more real impression of that authority across to the workers.

The hurrah technique—This is essentially in the nature of making a challenge to the other fellows. Not so much, "I dare you to do it," as "Let's see if you can do it." Sometimes this can be employed in stirring up a little competition among the workers or between shifts or departments to improve results.


Physical action—Somehow, the basic position and action and attitude of your body and face determine to a large extent your own mental and emotional attitudes, and thus to a very large extent convey to your listeners your real attitudes regardless of what you might be saying in words.

The secondary question—Elmer Wheeler says—"Don't ask IF, ask WHICH." Don't ask a worker if he wants to do it; don't just command him to do it; but ask him HOW SOON he can get it done, HOW

THE RIGIDITY AND ACCURACY  
OF SOLID REAMERS . . .

 THE ECONOMY  
OF EXPANSION REAMERS —

IN THIS **ONE**  
**SUPERIOR**  
**STAPLES**  
**TOOL**



The Staples Expansion Reamer is made with the tool body solid—not split. This construction gives rigidity and accuracy which the usual expansion reamer cannot offer.

The range of expansion is from .004" to .020". The tapered expansion plug permits easy tool adjustment to 1/10,000 of an inch.

Each expansion adds clearance to the cutting blades, presenting in effect a new cutting edge. This *exclusive* Staples feature permits expansion

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REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS •  
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All grip—no slip . . . no bearings, friction, heat or lost power . . . push out type . . . full spindle capacity or over . . . automatic adjustment . . . work re-set without stopping lathe . . . 2 sizes, 1" and 2" capacities . . . order now with proper priorities.

*Immediate deliveries.*

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Showing Reynolds No. 1-S attached to milling machine

Designed to promote peak performance in machines using a coolant (cutting or soluble oils), Reynolds Coolant units are the answer to demands for increased production and longer cutting tool life.

## REYNOLDS MACHINERY CO.

211 EDDY STREET, PROVIDENCE, R. I.

MANY he can turn out in a given time, WHICH MATERIAL will give the best results, etc.

And above all, never forget to ask the worker to do it. Be specific. Give him something definite to do to comply with your request. Don't ask for more production or better quality in a vague, indefinite way. Ask him to use his gages or "mikes" more frequently; wear goggles when grinding; use both hands, etc. Most people like to do favors. It increases their sense of self importance. Let them feel that they are helping and doing you a favor.

These and many other techniques will help to get results from the people you have to live and work with. But there is more to the dynamic side of the job than just understanding people or knowing the techniques of dealing with them. There is the long pull of supervision, the daily contacts with people wherein every detail of the operations of the department may come up sooner or later. And it is in this long pull of daily supervision where real leadership must play its part.

If you were to ask the chief executive of almost any large concern what single quality he felt was most essential to a foreman or supervisor, he would almost inevitably reply: — "Leadership." And leadership is the complete, rounded-out requirement of the man who is to be the "non-com" in industry. The technical phase of his work, including his knowledge and experience and ability to teach; the executive phase of the work including his ability to plan, to manage and administer, and the dynamic phase of the work including his knowledge of people and strategies of human relations all combine and enter into this one quality.

Perhaps you are one of the men who have most of the necessary qualifications for the job. I hope so. Perhaps you lack some of the essential qualifications. In either case, you have the job to do. It may be that your organization is expanding and looking for additional men for supervisory work. If so, you have a problem of finding and choosing the right men. For these reasons, another article in this series on the foreman's job discusses ways and means of selecting and training foremen and supervisors.





Fred's doing well here . . .



but he was always happier here

**F**RED called on you as the representative of your **Industrial Supply Distributor**. Today he's manning a gun or flying a plane. It may be nasty work, but he's doing it well because he has been trained for the job.

"Trained for the job" is the thing for you to remember about Fred. When he was calling on you before the war, he was trained for that job, too. Trained to locate supplies of scarce or critical materials for

your plant—trained in getting them to you on schedule—trained to anticipate your requirements. And especially, trained to suggest time-saving and money-saving methods that helped make your production more efficient.

Before too long now, Fred will be coming back—and with his return you can anticipate better service than ever before. In the meantime, *you'll find it still pays to*

Telephone your



FIRST!



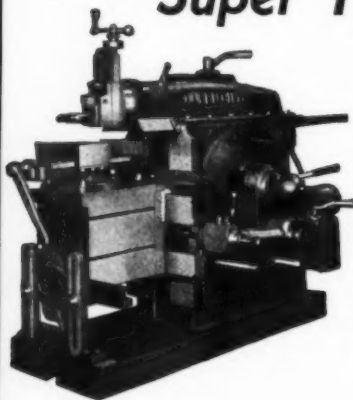
The **CLEVELAND**

Twist Drill Company  
1242 EAST 44TH STREET  
CLEVELAND

PHOTOGRAPHED BY THE U.S. AIR FORCE AND OTHERS  
300 THOMAS ST. NEW YORK 8 MONTHS JEFFERSON ST. CHICAGO  
400 HOWARD ST. SAN FRANCISCO  
500 OLD OAK COMMON LAX LONDON 11, ENGLAND



A

**NEW****More Efficient Shaper  
... 20% LOWER IN PRICE****THE 20"  
QUEEN CITY****Super Twenty Shaper**

The ram is of the V-type of wide bearing. Clutch is dry multiple-disc type. The feed range is extremely versatile — from .008" to .191", quickly and easily changed. A high torque motor for power rapid traverse is standard equipment. An electrical limit switch permits complete motor control. Timken bearings are used throughout.

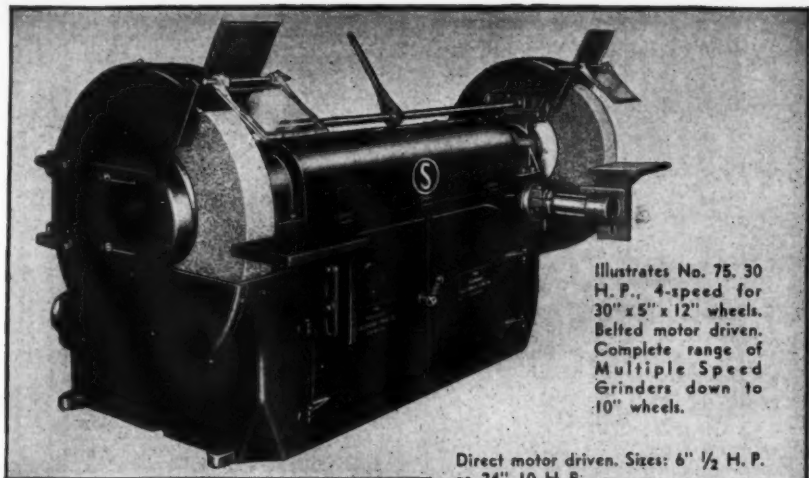
The new Queen City Super 20 Shaper offers advantages in price and performance no other Shaper of its type can equal.

A powerful, rugged machine, it is highly adaptable to both heavy production and a variety of tool room work. Many new operating features permit greater ease and convenience — to improve quality while increasing production.

For top performance, speed, versatility, accuracy and unusual economy, the Super 20 will fulfil your highest requirements. Write for detailed literature.

**Agents in Principal Cities.**

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MACHINE TOOL Co.**  
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CINCINNATI 2, OHIO



Illustrates No. 75. 30 H.P., 4-speed for 30" x 5" x 12" wheels. Belted motor driven. Complete range of Multiple Speed Grinders down to 10" wheels.

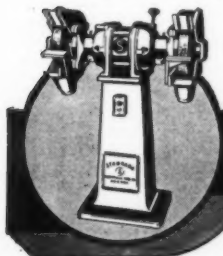
Direct motor driven. Sizes: 6" 1/2 H. P. to 24" 10 H. P.

## TOOL GRINDERS SNAGGING GRINDERS GRINDERS-ALL KINDS

*Catalog No. 43 shows*

GRINDERS: Portable, tool post, internal, disc, carbide tool, wet, vertical spindle, etc. BUFFING and POLISHING MACHINES, SPEED LATHES, etc.

*Write for your copy today.*



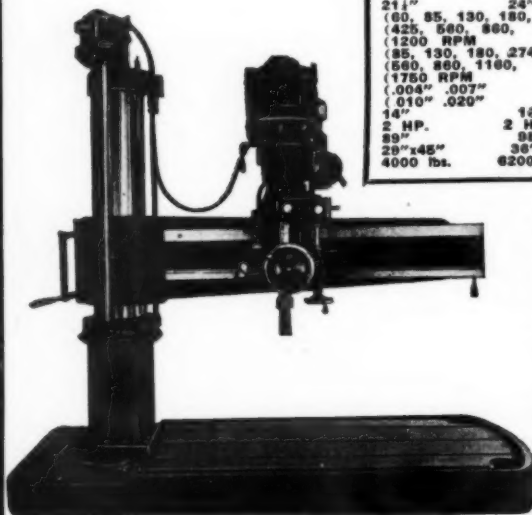
*The* **STANDARD ELECTRICAL TOOL Co.**

CINCINNATI - 4 - OHIO

**2486 RIVER ROAD**

# CANEDY-OTTO RADIAL DRILLS

**USED  
THE  
WORLD  
OVER**



## SPECIFICATIONS:

Drills to the center of circle on base or table  
Length of arm

Greatest distance from spindle to base

Minimum distance from spindle to base

Minimum distance from spindle to column

Traverse of spindle

Hole in spindle—Morse Taper

Diameter of spindle at nose

Traverse of head on arm

Traverse of arm on column

Spindle speeds with 1200 RPM motor

Spindle speeds with 1800 RPM motor

Feeds per revolution of spindle

Bearing of arm on column

Size of main driving motor

Height of drill column over gears

Working Surface of Base

Net weight

9" Column 3' Arm	11" Column 4' Arm	11" Column 5' Arm
73 1/2"	88"	120"
3"	4"	5"
43 1/2"	48"	48"
9 1/2"	15"	17"
10 1/2"	10"	10"
9 1/2"	9 1/2"	9 1/2"
No. 4	No. 4	No. 4
2 1/2"	2 1/2"	2 1/2"
25 1/2"	38 1/2"	48 1/2"
21 1/2"	24"	22"
(60, 85, 130, 180, 425, 560, 860, 1200 RPM		on all models
(85, 130, 180, 274, 560, 860, 1160, 1750 RPM		on all models
(.004" .007" (.010" .020"		on all models
14"	18"	18"
2 HP.	2 HP.	2 HP.
89"	98"	98"
28"x45"	36"x60"	36"x88 1/2"
4000 lbs.	6200 lbs.	7000 lbs.

Canedy-Otto has been the manufacturer of first-class, high-grade drilling units since 1892. These units are available in single spindle, multiple spindle and radial.

We can help you solve your drilling problems. Send for information on our complete line.

*Early delivery possible.*

**CANEDY-OTTO MFG. CO.**  
**CHICAGO HEIGHTS, ILLINOIS**

# SPINDLES

## THIS ONE WEIGHS 450 LBS.

This big POPE Spindle is a live center lathe tool for a production engine lathe. The Spindle is 53" long, 6 1/2" in diameter. Its center is easily removable without disturbing the bearings. The shell in which the center is mounted is carried on preloaded roller bearings capable of supporting work pieces weighing 10 tons.

The thrust bearings are preloaded to 7000 lbs. initial and pressure and are yielding mounted for axial movement. This provides automatic compensation for the expansion of the work piece from the heat of the cutting tool.



## THIS ONE WEIGHS 1 1/2 LBS.

This "ladyfinger" size spindle is an example of the small spindles built by POPE. It is 6 1/2" long, 1 1/4" in diameter. It operates at 40,000 RPM in a small portable grinder.

These large and small spindles are illustrated to show that POPE Precision Spindles may be had over a wide range of sizes as well as styles. We are prepared to build them as large or as small as you may need.

## Be They Large Or Be They Small

# POPE

## Will Build Them For You

POPE builds into a spindle what it takes to do the job right and to keep on doing it right.

POPE engineering skill and POPE precision craftsmanship are devoted exclusively to the development and production of the best possible spindle for the job. This means plenty of steel, plenty of bearings of the right kind, size and quality, and above all, skilled engineering and fine workmanship.

POPE Spindles feature Sealed Lubrication, specially selected precision bearings, rugged ability to stand up under hard work and at the same time to produce a better final finish.

\* \* \*

Send us a sketch or description of the spindle you require and we will furnish you cost and delivery estimates.



### POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS  
BUILDERS OF PRECISION SPINDLES



## YOUR TAX PROBLEMS

### FIGURING EXCESS PROFITS

By ARTHUR ROBERTS

**C**ORPORATE taxpayers should be cognizant of the methods by which they may obtain relief under the excess profits tax measure because, unless this phase of taxation is handled intelligently, hardship may result. The Internal Revenue Code provides means for relief and every corporation is entitled to its share.

Under this provision of the law, excess profits are measured by levying a tax on profits exceeding 5% to 8% of the earnings on investment, or by taxing the excess profits earned. This excess is determined by comparing earnings for a current year with the base period years fixed by law, from 1936 thru 1939 (the four years preceding 1940).

The first \$5,000 of excess profits net income is exempt from tax. The rate is 90% with certain credits, limitations and other factors that the taxpayer must consider in computing the result. The sub-

ject is too involved to detail the circumstances under which a corporation may get a higher credit and reduce the excess profits tax. Each case must be studied and handled individually. I can only advise that great care be given the handling of this important problem. The U. S. Treasury Department publishes Regulations 112 relating to the excess profits tax, which every corporation should have on hand.

The base period net income must be considered carefully. If it is an "inadequate standard of normal earnings", a corporation's tax will be excessive. An adequate standard of earnings in the base period depends upon a number of factors that users of machine tools must not overlook.

Suppose the taxpayer's business were depressed in the base period because conditions in his industry caused his profits cycle to differ substantially in length



### BAND SAW WELDERS

The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to 3/4" wide may be welded. 220 and 110 Volt, 60 Cycle, single phase, 5 point heat control, 1 point anneal heat. Shipping weight 79 lbs. Let us send you further details.

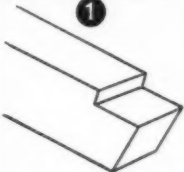

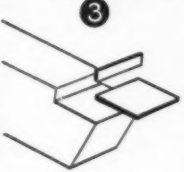
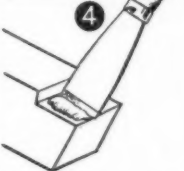


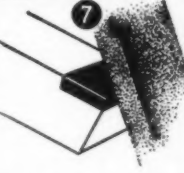
Mfrs. of complete line of Spot, Buff, Seam, Flash, Projection and Special Welders.

**WELDEX INC.** 7325 McDONALD AVE.  
DETROIT, MICH.

# Tips on Tipping

## COOPER-BESSEMER MEEHANITE TOOL BODIES

In hundreds of busy war plants, machine shops are saving money and critical tool steel by brazing carbide cutting tips on Cooper-Bessemer Meehanite Tool Bodies. If you are not doing it, the sketches below will show you how simple the operation is:

 <p>1</p> <p>Mill necessary recesses in Meehanite tool body to suit type of tip.</p>	 <p>2</p> <p>Clean all surfaces to be joined (both recess and tip) with carbon tetrachloride.</p>	 <p>3</p> <p>Cut strips of silver solder to conform to sides and bottom of carbide tip.</p>
 <p>4</p> <p>Coat recess surfaces with flux. Lay silver solder in place, coat lightly with flux. Grind side and edge of tip and lay in place.</p>	 <p>5</p> <p>Heat tool bottom underneath recess, working up sides, till molten solder flows freely (Temp. 1275-1300° F.). While heating, the tip should be held in place firmly by a steel rod.</p>	 <p>6</p> <p>To prevent checking, cool tool slowly, burying it in asbestos, mica or lime. Do not cool in water.</p>
 <p>7</p> <p>Finish grind tool, using razor edge on tip to .005" radius to prolong tip life.</p>	<p>Meehanite is ideal for tool shanks, milling cutters and forming tools. Furnished by Cooper-Bessemer, they are well-designed, properly balanced and carefully made. They are easy to finish machine. They absorb vibration, eliminate tool chatter. They permit faster cutting because they dissipate heat faster and do not load up so fast. SEND FOR BULLETIN 53-T-2.</p> <p><b>THE</b> <b>Cooper-Bessemer</b> <b>CORPORATION</b> Industrial Tool Division Dept. R. Mount Vernon, Ohio</p>	

## INDUSTRIAL DIAMOND TOOLS FOR EVERY USE



Our No. 703—three layers of seven diamonds each. Multiplicity of cutting points; depending on diameter of wheel, four or more diamonds will always contact the wheel, giving finer dressing and precision finish. Recommended in all straight-faced dressing and truing on wide-faced, hard silicon carbide wheels. Used most effectively on Cincinnati Centerless, Norton Cylindrical, Landis Cylindrical, and Cincinnati Cylindrical Grinders.

Requires fewer passes across the wheel.

Generally used with fast dressing traverse.

**"Experts agree they are the  
best on the market."**



**Molina**  
INDUSTRIAL DIAMOND CO. OF U.S.

31 W. 47th St., New York 19, N. Y.  
Branches: London; Bahia, Brazil

and amplitude from the general business cycle. The yardstick used in measuring business cycles is the economic activity of a past period. Hence, a taxpayer's experience figures or historical figures covering the industry as a whole must be considered in arriving at this variation from general business activity.

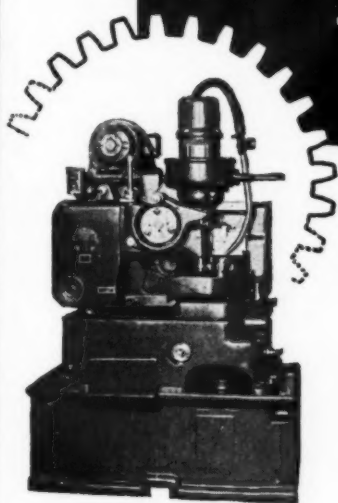
If a taxpayer can show that earnings were depressed in the base period years in comparison with the general business cycle, he may be entitled to relief because the tax otherwise would be excessive or discriminatory. To prove this point, the taxpayer must compare the base period earnings with earnings for a longer period. The selection of this period is not fixed. It depends upon when a corporation opened for business and its experience figures resulting from operation.

However, the Bureau of Internal Revenue advises that where the base period may be a poor yardstick to measure normal earnings, the period from 1922 to 1939 will generally be the most appropriate longer period to use in making such comparison. There are reasons why this longer period may be a good yardstick to measure an adequate standard of normal earnings. It includes the extremes of business cycles, topflight prosperity and sea-deep depression and the level-offs afterward. It is fairly recent so memory is not dimmed and we have more complete data concerning this period than any prior period. It was not affected by war, which obviously will distort normal operating figures tremendously. The big depression after 1929 was abnormal enough, yet, the prosperity it left behind did offset this abnormalcy so that 1922 to 1939 may provide a good reasonable average. At any rate, the Bureau of Internal Revenue suggests the use of this period for taxpayers whose earnings in the base period years from 1936 thru 1939 are "an inadequate standard of normal earnings". In short, if earnings in the base period are subnormal, it is up to you to arrive at normal earnings by every legitimate means, otherwise, you may pay more tax.

Under certain circumstances, you may pay an excess profits tax if earnings in a subsequent period are normal or even



# Post-War Products will demand Better Gears than ever before



**PRECISION GEARS** can be cut with closest control over accuracy on the Fellows Gear Shaper—and the same machine will cut both internal and external gears.

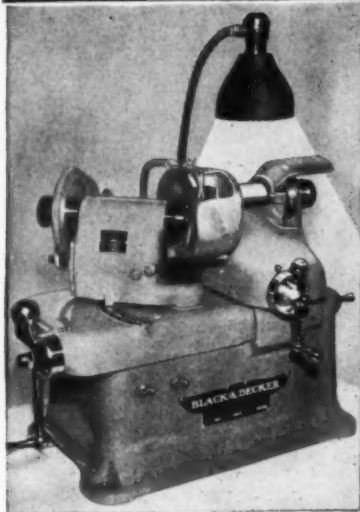
The Gear Shaper method also handles both spur and helical gears, and a Gear Shaper, by a simple substitution of cutters, can be used for cutting cams, or an infinite variety of irregular or interrupted profiles.

Every machine shop should have complete information on Gear Shaper manufacturing equipment. Write:

**THE FELLOWS GEAR SHAPER  
COMPANY**

78 River St. Springfield, Vermont—640 West Town Office Building, Chicago, Illinois—616 Fisher Building, Detroit, Mich.

## VIMCOLIGHT



## CANCELS OUT THE "SHADOW MENACE"

It's remarkable how glareless, clear, shadow-free VIMCOLIGHT conserves the EYE-POWER of machine tool operators. This modern, improved lighting helps cut down spoilage and steps up production because it reduces eye fatigue and strain. VIMCOLIGHT spotlights the work at exactly the desired angle and is quickly adjustable from one position to another. Inexpensive . . . easy to install . . . used as standard equipment on many leading machine tools.

**VIMCO Manufacturing Co.**

109 Chenango St.

Buffalo 13, N. Y.

when income is not subject to the normal tax or when there are no earnings. The base period figures have much to do with this so give thought to them.

But the selection of another base period is not the "all of it". The taxpayer must exclude those years which held "identifiable non-cyclical circumstances" that increased or decreased the taxpayer's income abnormally.

In other words, we might say that a taxpayer had a fire, not fully covered by insurance, and lost \$25,000 plus a shut-down. This would make his income abnormally low for that year and would throw the average for the period off-center unless the figures for this particular year were excluded or adjusted satisfactorily. On the books, of course, the \$25,000 fire loss more appropriately would be charged to surplus than income, although usually such losses are deductible on the tax return. Nevertheless, a fire of this magnitude to a moderately-sized concern more than likely would throw profits out of line for that year and might affect the computation of the excess profits tax if included in base-period figures.

Then too, not only may a taxpayer's business experience abnormal years, but an industry as a whole may go off the beam during an extended period, such as from 1922 to 1939. Because of a shift in consumer buying, the output of an industry may sink or soar and then revive to normal production again.

In a case of this kind, the ratio of earnings to capacity might be used with safety but it is only an approximation. Its adequacy will depend upon the taxpayer's case, the concern's experience figures and those of the industry of which it is a member. Probably a better way would be to take the ratio of aggregate net earnings to total assets, net worth or capital assets alone or in combination as the basis for the adjustment of long-term earnings to income in the base period.

Business cycles represent changes in trends for many reasons and usually are fairly short-term. Where an industry has a long-term cycle, 18 to 20 years, it may go back prior to 1920 to get the comparative data. Where changes in a taxpayer's business have been marked from a profit

# .0005"

Fine accuracies can be secured only through the use of machines built to maintain exacting specifications.

## PRECISION IS OUR BUSINESS

For over 57 years Sebastian has built lathes exclusively



*"Best Lathe In The  
Medium Price Field"*

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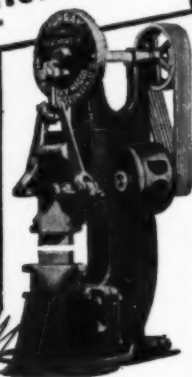
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standpoint during a long-term cycle, it is usually advisable to use the annual ratios of net income to net worth, from which the average of the ratios, deficit included, may be determined.

These phases of the excess profits tax regulations depend upon wise selective judgement, not upon debit and credit technique, mathematical accuracy or direct authority written into the Code. That is why the matter should be handled by one who has a broad understanding of the taxpayer's business and its financial history, the business movement of the industry as a whole and general business conditions. Otherwise, the tax return may not reflect maximum economies permitted under the excess profits tax regulations.

In short, a knowledge of accounting and tax law isn't all one needs to pierce the haze enveloping our income tax legislation. The individual responsible for a tax return also must be a good research man, a statistician, an economist and be quite a logician. A tax return, if it is to do justice to the tax collector and the taxpayer, must reflect accuracy in accounting, intelligent research, a knowledge of business cycles and statistics, trends and other economic factors. Then one must be able to back it all up with a logical argument because some of the entries on tax returns leave the fields of law and accounting and enter the realm of reasoning. These are the borderline cases usually, begotten of a tax law that has grown wild and unwieldy, because so many amendments and revisions have been planted beside the original growth that the light of understanding is now dimmed by the dense foliage.

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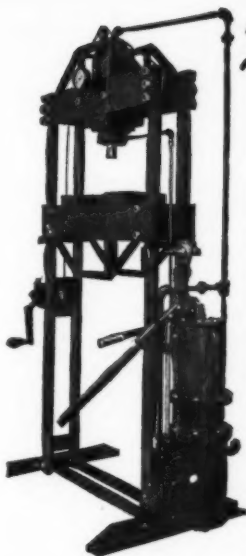
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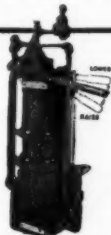
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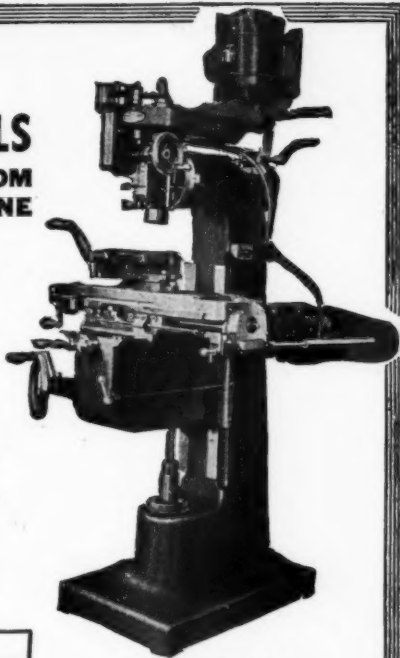
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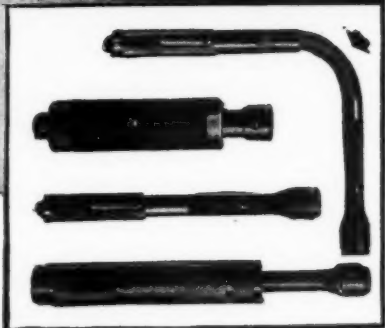
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# Machining With Pneumatic "Cushions"

By ED. C. POWERS

**O**F ALL the indispensable uses of compressed air in factory operations, probably the least publicized but, nevertheless vitally important, are the simple ways in which it is applied to cushion the action of various machine parts and thus effect smoother, faster operations.

Perhaps the most common air usage in regard to machine and bench tools has been its widespread adaptation for operating chucking devices on lathes, millers, vises and similar machinery.

Other uses in this category include those where simple air cylinders are affixed to machines to eliminate handling operations, reduce rejects and increase machine productivity by smoothing the sequence of work.

In one large mid-eastern shop, for instance, a large air cylinder is used to counterbalance the vertical movement of the head on a draw shaper, (Fig. 1). On this machine a 60-pound air pressure effectively balances the head when it is not equipped with a cutter head or a cutting tool. When such tools, including a special boring attachment are installed, an easily regulated air pressure can be adjusted to compensate for the added weight.

Not only does this air cushion eliminate cumbersome, counterweights but it insures smooth, chatter-free travel and exact balance under all operating conditions.

As an aid in machining Diesel engine pistons, compressed air does a remarkable job in assisting piston facing operations. This setup, illustrated in Fig. 2, shows the small air cylinder installed on the tool holder at the left which absorbs the cutting tool pressure exerted by thrust of the roller working against an abruptly curved cam.

The double action is operated by a three-way valve (also shown at left in Fig. 2) and permits smooth feeding of

the tool either towards the center or outwards when facing the dome-shaped pistons.

A predetermined air pressure in the cylinder holds the roller against the curve of the cam, thus reproducing exact shape on the work.

Another important job where the cushioning effect of compressed air is very advantageous is in the operation of the centrifugal babbiting machine shown in Fig. 3.

The machine is equipped with a live spindle tail housing which is actuated on its slide by a double-acting air cylinder suspended between the ways. A marked

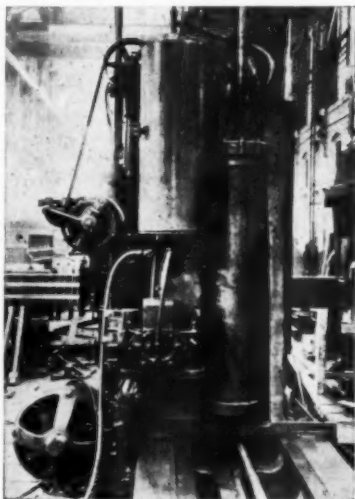


Fig. 1—Air counterbalances the vertical movement of the head on this draw shaper machine. (Courtesy Compressed Air Institute).

# 3

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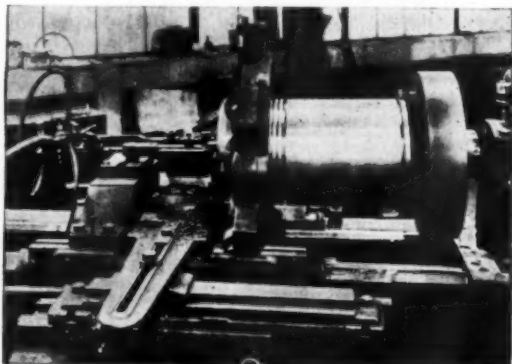
expansion and contraction which takes place during the babbitting operations when hot metal is poured into the work is easily taken up by cushioning the revolving locating flanges thru the dual-acting air cylinder.

To maintain the necessary seal between

the flanges in any other way would present a difficult problem which would no doubt be costly to maintain. In comparison, this air installation has been in operation for more than four years without cost for repair or upkeep.

Further use of air power is employed

Fig. 2—The small air cylinder shown at the left effectively cushions the cutting tool pressure to assure smoother and more efficient work. (Courtesy Compressed Air Institute).



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9/16	8	10.80	5/8	2	11.80
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25/32	9 1/2	12.40	27/32	2	13.60
13/16	9 1/2	12.50	7/8	2	13.80
27/32	9 1/2	12.80	29/32	2	14.00
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15/16	10	13.50	1	3	14.80
31/32	10	13.80	1-1/16	3	15.70
1	10 1/2	14.00	1 1/8	3	16.60
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1-3/16	11	16.70	1-5/16	4	19.40
1 1/4	11 1/2	17.60	1 3/8	4	20.40
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1 3/8	12	19.60	1 1/2	4	22.40
1-7/16	12	20.60			
1 1/2	12 1/2	21.60			

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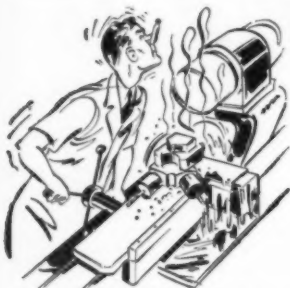


Fig. 3—Centrifugal babbitting operations are made possible on this machine by the application of air pressure to cushion the spindle tail housing as it travels on its slide. (Courtesy Compressed Air Institute).

in this babbitting procedure by using an air jet to cool the work more rapidly.

These are but a few of the scores of

similar compressed air uses where it is easing the strain of today's high speed production operations.



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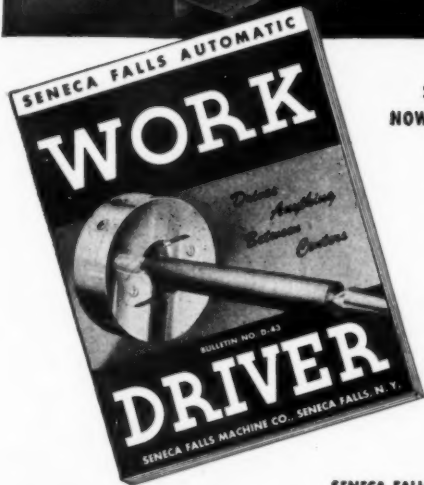
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# Specifications on Layout Drawings

By H. F. WILLIAMS

**D**URING the course of the inventing and designing period of a new machine, or some other piece of mechanical equipment, many pages of data are collected in the form of freehand sketches, small scale drawings of letter paper size, research data, and a host of sheets of lengthy calculations. This the designer usually guards jealously, considering it his own personal property until the machine has been detailed, machined, assembled and put thru its paces during the trial run. Not until the bugs have all been ironed out and the machine turned

over to the production force does the designer relinquish his guardianship over the proven data.

However, much of this information must be available when the machine has had final approval and is ready to be turned over to the detail draftsman. It is then that the designer would do well to study the architects' method of making notes on assembly drawings relative to types and sizes of structural shapes, joists, rafters and studding sizes, cement mixtures, roof coverings and other essential data



Fig. 1.

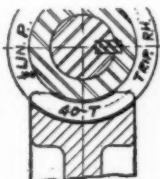


Fig. 2.

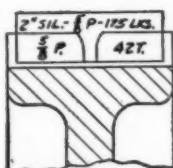


Fig. 3.



Fig. 4.

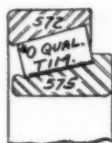


Fig. 5.

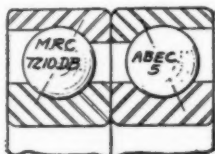


Fig. 6.

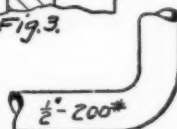


Fig. 7.



Fig. 9.

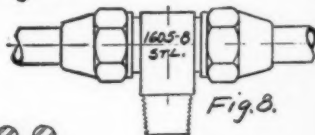


Fig. 8.

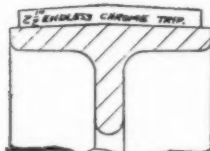


Fig. 10.



Fig. 11



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so necessary to the builders. Many mechanical assembly drawings and layouts are devoid of notes and dimensions pertaining to the aforementioned data accumulated during inception of the machine, except perhaps the designer's name and date of completion.

When the average engineer finishes a machine, he does not necessarily mark time by waiting until it has reached the checking stage but immediately starts on the design of another machine. His position might be such that he is compelled to travel during crucial moments when information is urgently required, or he might have his office in an entirely different building from that in which the details are made and often cannot give up time for making frequent or periodic trips to the detailing department.

To overcome these difficulties, to eliminate confusion and save time, the designing engineer should incorporate on his original layouts and assembly drawings, pertinent and concise information so as to instruct those who carry the job thru to the complete machine. These short notes disclose such data as sizes, capacities, number and kinds of teeth, pitches, links, fits, types, speeds and feeds, travels, pressures, numbers of special threads, load reference numbers and much other data which takes up no extra space as shall be explained later.

Probably the most important procedure is to place on the assembly drawings, vital dimensions such as floor to spindle or main shaft center line and the amount of movement of the various component parts. Range of sizes, important center distances of all types of gearing and lengths of travels also fall into this category.

Direction of main rotating parts should be displayed with a circular line and arrowhead at the end for denoting how the spindles, shafting, all types of gears, motors, pulleys and sprockets run. Motor frame sizes, capacities, hp and speeds should be included.

When gearing is used, instead of the detailer taking a chance on measuring the addendum and pitch diameters, the num-

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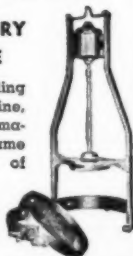
*Above Illustrated*

### JEFFERSON ENDLESS BELT SANDER

For wood or metal finishing. An economical machine which eliminates costly hand sanding and finishing. For either large, small, flat, concave or convex surfaces.

### JEFFERSON GYRATORY FOUNDRY RIDDLE

... for screening, moulding and core sands. For fine, medium and coarse dry materials. Note hinged frame which permits change of sieve. Has capacity of 10 men riddling by hand. Over-all height 60".



**JEFFERSON  
MACHINE TOOL CO.**

700 W. 4TH ST.

CINCINNATI 3, OHIO

ber of teeth and pitch are lettered in the space representing the whole depth of the tooth as in Fig. 1. This permits calculation of pitch diameters and center distances in a thoro and accurate manner. The pressure angle such as 14 1/2 or 20 degrees should be included. Worm gear teeth and reductions, whether single, double or triple or other leads of worms are shown as in Fig. 2. Under gearing, sprockets and chains are also noted the number of teeth, circular pitch, width, number of links, type and make of chain are given as in Fig. 3.

Woodruff keys would be numbered as illustrated in Fig. 4. If a plan or end elevation drawing of the assembled mechanism is not available and if such a number did not appear on the layout, the detailer would have no assurance that he had selected the right key by scaling the depth of keyway in the mating piece. The American Standards Ass'n with the sanction of several prominent national societies, has assigned numbers to Woodruff keys for easy identification. In the example shown, the last two digits in the number represent the number of 1/8" for the length of the key, while the first two digits represents the number of 1/32" in width or thickness. Therefore, the sizes as given by 1211 means 12/32 or 3/8 wide by 11/8 or 1 1/8 long. In a three digit number, only the first number refers to the number of 1/32" wide while the last two are as explained. Once the detailer knows this system, number 1211 tells him everything he needs to know for his drawing.

Roller and ball bearings in Figures 5 and 6 respectively, are good examples of the necessity for exact data. Many of these are in metric scale and are not laid out sufficiently accurately to be scaled with assurance. In the former, the number of the cone and cup should be inserted in their respective places and the quality or precision number and make should also be included. Sizes and types of ball bearings together with the Annual Engineering Committee (A.B.E.C.) quality number are all that is necessary except the maker's initials or abbreviation of name. In case single bearings are so specified, the cross sectioning can be omitted on one side of the centerline and

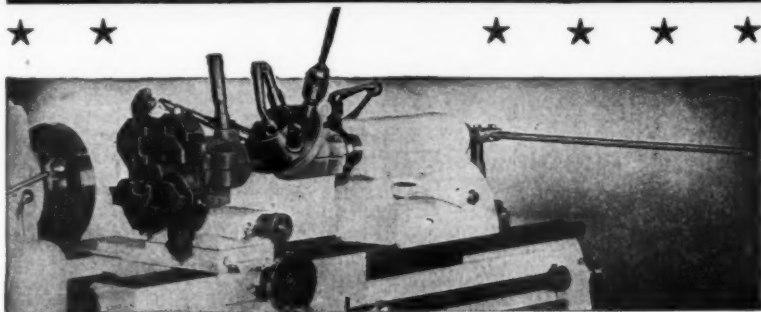
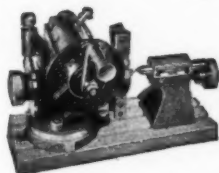
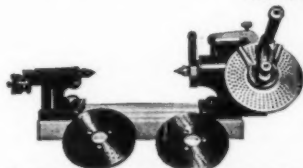


Photo above shows Jefferson Turrets on 16" lathe



7 1/2" Swivel Base Dividing Head — In Stock  
IMMEDIATE DELIVERY  
No Priority Required



PLAIN DIVIDING HEAD — complete with 3 Dividing Plates, 1—24 notch rapid Indexing Plate and Tailstock, Delivery 2 weeks.

7 1/2" Swivel Base Dividing Head and 6" Tilting Dividing Heads. Immediate Delivery.

Some territories still open for dealers and salesmen.

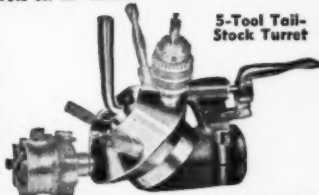
## Convert YOUR ENGINE LATHE INTO A TURRET LATHE IN 15 SECONDS

Yes, it's as easy as that! You simply attach the Jefferson Tail-Stock Turret, the Jefferson Tool-Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration.

The productive capacity of these machines will be more than doubled in many instances because there will be available at all times NINE DIFFERENT TOOLS.

With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe, or changing tools. THE JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing.

Jefferson Turrets are real production tools—substantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market.



5-Tool Tail-Stock Turret

PAT. PENDING



4-Tool Tool-Post Turret

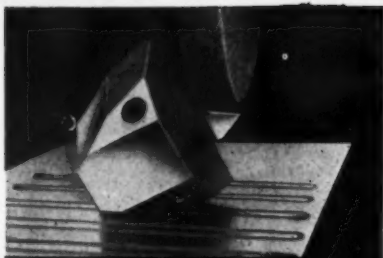
TURRET DELIVERIES IN 6 DAYS

# JEFFERSON MACHINE TOOL CO.

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Tool-Post Turrets, Tail-Stock Turrets, Adjustable Pull Feeds, Belt Sanders, Gyrotrary Foundry Riddles, Overhead Swing Frame Grinders, Milling Machines, Dividing Heads and Vises.



## GRIND

*both* 29° and 60°  
THREAD TOOL BITS

Accuracy, uniformity, and precision are assured in grinding both Acme 29° and National 60° left or right hand thread-tool bits, with or without rake on the cutting face. No graduated scales or moving parts to wear out. Two sizes, complete with adapters: Model A for the mechanic's tool kit \$16.75... Heavy Duty Model B for the shop \$35.00.



Fixture can be easily clamped to work table when magnetic chuck is not available.

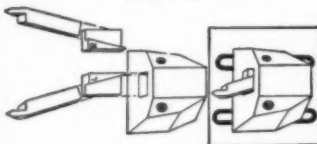


Diagram shows how to grind 15° right and left hand bent tools with standard adapters.

For complete information, call your Clark Cutter Jobber today, or write for catalog MMS-2-GF.



*Robert H. Clark Company*

5122 SANTA MONICA BOULEVARD BEVERLY HILLS, CALIFORNIA

the notes inserted in the inner and outer ring areas and in the circles representing the balls. After the detailer has this meager but complete information, he has only to refer to that company's handbook to get the necessary dimensions and tolerance for both shaft and housing measurements. If preloads are of a special nature in certain types of ball bearings, they should also be inserted in the space provided.

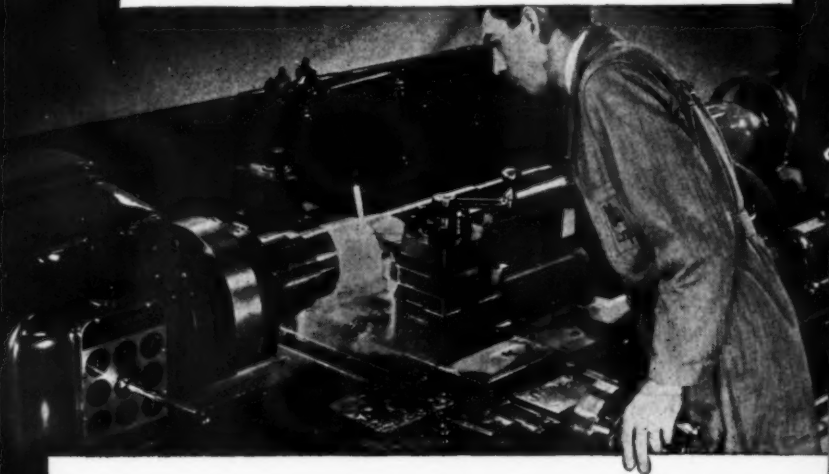
If the machine or mechanism is hydraulically operated, pressures in psi should be lettered within the two lines that represent the O.D. of the tube and outside diameters should also be included as shown in Fig. 7. Previously standardized wall thicknesses will tell the detailer what areas he is working with, once he knows the O.D. Pipe and tube fittings are likewise standardized and are specified as in Fig. 8. Especially in the various shapes of tube fittings, the manufacturers have assigned shape numbers as represented in the sketch. The figure "8" refers to the number of 1/16" of tube O. D. or in this instance 1/2" O.D. Material can also be specified in an abbreviation as for steel, brass, aluminum or other metal. Tube fitting manufacturers in some instances break down a fitting into its component parts such as shape, nuts, sleeves etc. while others sell the whole assembled fitting as a unit. The manufacturer's catalog will have to be consulted and his method of specification understood when the parts list is written.

In belting, it is very necessary for the detail man to know size, ply, type and length. As in Fig. 9, one of the five sizes of Vee belt cross section represented by letters A,B,C,D and E are listed. These letters do not include the types for fractional hp drives or whether the belt is oil-and-heat-resisting or static-free. Such information together with length in inches as represented by the figure 210 in the sketch should also be given. For flat belts, width, kind of leather, ply and whether or not the belt is endless or joined with metal clips or other fastenings, is necessary. This is illustrated in Fig. 10.

Unless the designer turns over to the detailer the various specifications of

350 SURFACE FEET PER MINUTE

TOUGH STEEL...TOOLS TAKE IT



## SUNOCO EMULSIFYING CUTTING OIL

...removes 35 cu. in. of S. A. E. 1045 steel per minute

Cut deep . . . cut fast . . . cut long—that's the task for tools today, and throughout America production men are relying on Sunoco Emulsifying Cutting Oil.

In one operation, on an American Pace-maker Lathe, they were turning S. A. E. 1045 steel at 270 RPM and taking a cut  $\frac{1}{8}$ " deep. The diameter of the piece being turned was 5"—350 surface feet per minute. In every minute, 35 cubic inches of tough steel were removed . . . but the tools "took the rap" thanks to Sunoco Emulsifying Cutting Oil.

Tool life increases when tools and work are flooded with Sunoco. The outstanding cool-

ing and lubricating qualities of this cutting oil makes possible the prevention of overheating and drawing of the temper at the cutting edge and the reduction of "down time" for tool resharpening and resetting. Chips do not seize; the tools cut cleanly . . . evenly . . . at high surface speeds.

To speed production in your plant, get the details on Sunoco Emulsifying Cutting Oil . . . and to get worthwhile factual data on all types of machining operations, write for your copy of "Cutting and Grinding Facts" to . . .

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Sponsors of the Sunoco News Voids of the Air — Lowell Thomas

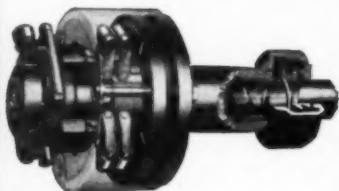


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OILS FOR AMERICAN INDUSTRY

# TO PREVENT-

## LOSS OF TIME AND LABOR



drive your productive machinery by the powerful, persistent torque developed by MULE-PULL CLUTCHES . . . it saves time and boosts production by the smooth and instant acceleration it gives. The Loose Sleeves of these Clutches have RING-OILING lubrication which prevents ground-out bearings and avoids costly repairs. The single-arm, anti-friction ROLLER TOGGLES which actuate these Clutches give high horse-power capacity; require no lubrication and are free from repairs even under constant in-and-out engagement.

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No. 25-B DESCRIBING**



**MULE-PULL  
CLUTCHES**

**BROWN ENGINEERING CO.**  
126 N. THIRD ST. READING, PA.

springs, he should place on the assembly drawing the load he expects to use at a given length of compression. This is shown in Fig. 11. When two positions of the spring are necessary, loads at each length are shown. From this data and the scaled dimensions of O.D. or I.D., the detailer can find the required wire diameter in a spring chart. It should be noted here that the most satisfactory results relative to springs are those in which the designer has previously designed around a specific spring, rather than trusting to luck that some sort of workable spring can be calculated for a given space of diameter and length. Too often this is left to chance when upon completion of the job it is found that not enough space is provided to have the spring function properly, or that wire of special shape or analyses is required, possibly both of which are unobtainable in these war days.

Catalog reference numbers on manufacturer's symbols of all purchased parts are to be included on layout drawings for engineering efficiency. Some of these items include:—electrical equipment of all kinds, pumps, gaskets, oil gages, clutches, couplings, oil seals, oil strainers, filters, oil and grease fitting, sleeve bearings, structural shapes, sizes and weights per foot, collets and chucks, grades of felt, flexible shafting, metallic and non-metallic hose and tubing, (the latter whether metal or plastic), gages and indicators, instruments, universal joints, snap rings, valves, wire mesh screening and many others.

If angles are to be accurately held they should be so specified. Likewise, other important notes are for special fits and tolerances, grades of finish, special materials, Rockwell, Brinell or Scleroscope hardness numbers, tapers, special threads and standard spindle noses (if any).

It is to be expected that all layout drawings and special data be signed and dated by the designing engineer. Not only should the finishing date be given but the starting date is often overlooked. The drawing should contain both. The starting date is very often important if patent difficulties should arise later.





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more economical operation**

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## **MODERN-MAGIC CHUCK AND COLLET EQUIPMENT**

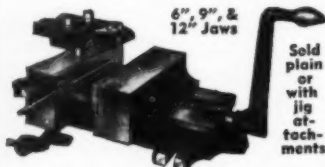
Equip your multiple or single spindle machines, used for a sequence of operations, with MODERN-MAGIC Chucks and Collets, and step up your production. Idle time of revolving spindles is reduced to zero . . . tools can readily be changed while the machine is running. Single spindle machines are given practically multiple spindle range by these MODERN tools. They pay for themselves many times over in time saved. Full information upon request. Why not investigate today?

**PROMPT SHIPMENT...  
USUALLY FROM STOCK**

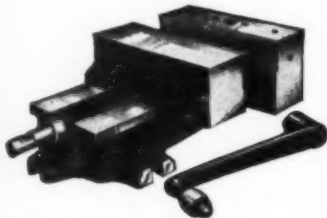
# **MODERN TOOL WORKS**

DIVISION OF  
**CONSOLIDATED MACHINE TOOL CORPORATION**  
ROCHESTER 10, NEW YORK

## "Ready-made tooling" for new conversion jobs



### GRAHAM MULTI-PURPOSE VISE



These vises can take the place of many a jig and fixture that otherwise would have to be specially made. Special jaws, stops, guides, etc.,—PLUS the built-in accuracy of the flush, parallel, square construction—enable you to use this vise on planer, shaper, drill press, miller, grinder, radial, etc. Sizes up to 124 lbs.

*Request Illustrated Price Circular*

## GRAHAM MFG. CO.

52 Bridge St., East Greenwich, R. I.

In summing up, incorporating these short but important bits of data on the general original layouts, assists the detailer in doing a better, quicker and more efficient job. The checker has something to start on as he coordinates the dimensions accurately.

The man who writes the specifications into the parts and materials lists is not always the designer himself. If the data is available, there's no duplication of effort in getting specifications from the designer.

## JOHN'S DRILL JIGS

### For Tapping Machines

These jigs are now provided with universal jaws which permit quick set-up for end drilling and tapping.

The reversible V plates will accommodate a large range of diameters.



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efficiency ★  
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THE NEW  
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PRECISION GRANITE  
SURFACE PLATE



PATENT  
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THE ultimate in the three vital factors of precision work — ACCURACY—EFFICIENCY—ECONOMY. The new Herman Granite Surface Plate will enable you to solve all your precision gauging plate problems. These plates represent the greatest step forward in surface plate development in half a century. They will meet every exacting requirement of tool-room, production and inspection operations. Here are just a few of the pertinent facts about Herman Granite Surface Plates.

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Make the shop test by writing us to request a specific date to try Herman Granite Surface Plates in your own shop under conditions as they really exist, at our expense. Write today for descriptive literature and price list.

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as well as U. S. Bureau of Standards  
Write us for authoritative  
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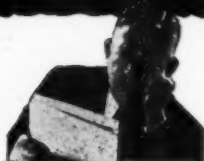
*The Herman Stone Co.*

324 Harries Bldg., Dayton 2, Ohio

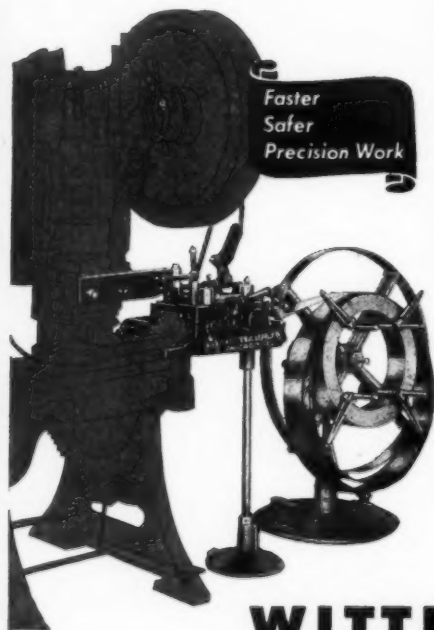
# *Planning Peacetime Production Using Coiled Strip Stock?*

Equip with

## **WITTEK**



## **Automatic Roll Feeds and Reel Stands**



Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

*Write for catalog, prices and  
recommendations*

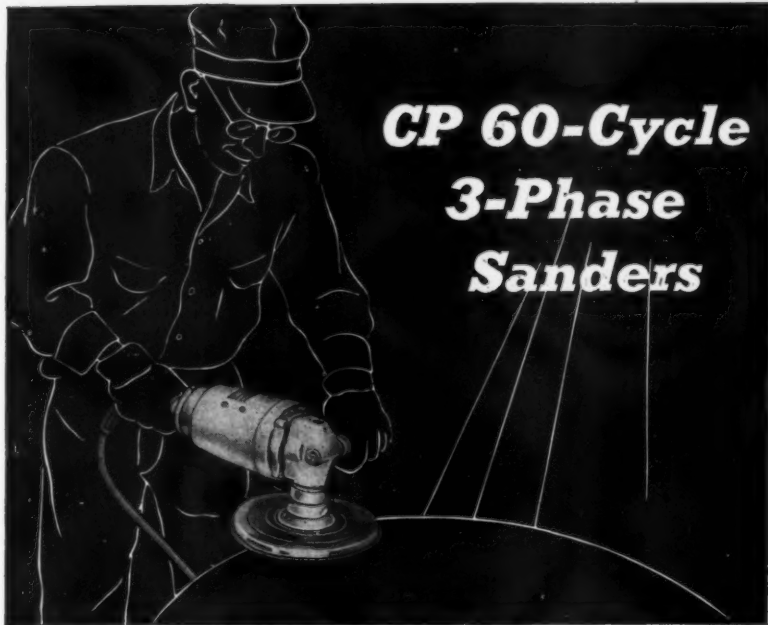
## **WITTEK**

**MANUFACTURING CO.**

4305-15 West 24th Place, Chicago 23, Ill.

*Automatic*  
**ROLL FEEDS  
AND  
REEL STANDS**





## CP 60-Cycle 3-Phase Sanders

### ... fast, uniform sanding

CP-460 Sanders — comparable to high frequency tools in their high sustained speed, efficiency and low maintenance — are designed for plants whose operations do not warrant high frequency installations, or plants that have such tools but lack high frequency power lines at points where additional tools could be advantageously used. Powerful, light-weight squirrel cage induction type motor — operating on 60-cycle, 3-phase, 220-volt A.C.—maintains speed under load. Elimination of commutators, brushes, and wound armatures, reduces maintenance expense. Write for full data.

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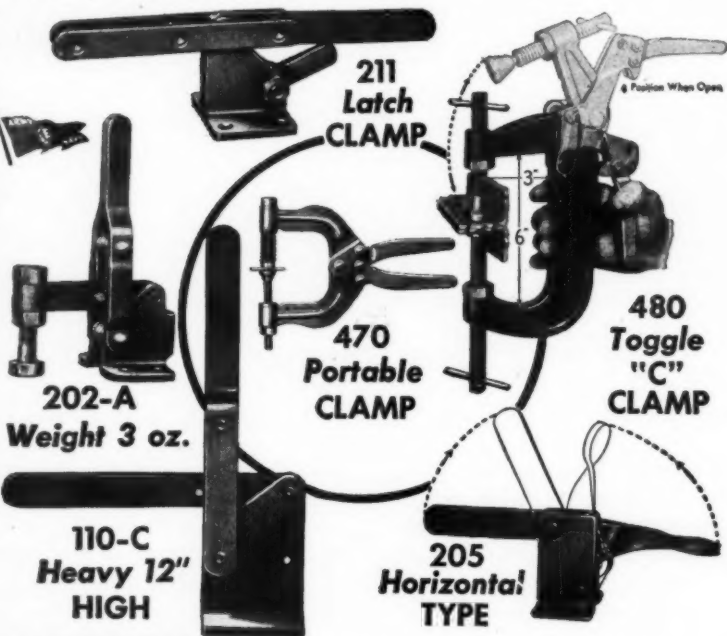
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★ Then you'll need some of those quick acting, positive holding, De-Sta-Co  
★ Toggle Clamps... Bulletin No. 43 illustrates and details many types...  
★ complete range of sizes, and will help you in the selection of clamps best  
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*Adjustments of Micrometer exactness can be made safely while saw is running.*



# STOP Bandsaw Breakage

with

## CARTER Micro-Guide PRECISION BAND SAW GUIDES

Because the Carter Micro-Guide is precision built; because it has only one set of jaw blocks and thus reduces friction on the saw blade; because these jaws can be adjusted either forward or backward without twisting or binding the saw; because 3-small elements take all the wear breakage of bandsaws is practically eliminated. Work is held rigidly. Saw runs freely and at vastly higher speeds.

Two Micrometer screws, with knurled knobs adjust jaw-blocks independently. Two wide jaw blocks are held securely. Friction is reduced 50% under other guides. Carter Micro-Guides are economical in maintenance and 3-small wearing parts are replaceable. Send for information, today.

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## PRODUCTS COMPANY

204 North Division Bldg., Grand Rapids 2, Michigan

### FEATURES which *Benefit* You!

- Precision, quality made
- 50% less friction
- Ball Bearing Wheel
- Renewable Wheel Rim
- High Speed Operation
- Self-Oiling
- Dirt Proof
- Easy, Safe to Adjust
- Best, Simplest Design
- Moderate Price
- Big Savings
- Immediate Delivery

*Band Saw* WHEELS • TIRES • GUIDES • GUIDE LIGHTS

# FRICTION SAWING

**A**S the result of recent demonstrations on actual machines, particularly at the Cleveland Metal Show, and because of widespread claims, some of them seeming rather startling, interest has been aroused all over the world in the revival and expansion of a rather old but little known art, friction cutting.

Friction cutting with a band saw has been employed by foundrymen for years, but they didn't call it that. To them it was just band sawing. They removed gates and risers from their castings as a matter of course. If the sparks flew all over the place—so what? The method worked and their job was to remove unwanted metal, not worry about theory.

During this war, certain aircraft plants "discovered" the method as a result of speeding up their regular contour band saws to get more cutting footage per minute. They found that, at high band speeds,

it mattered little whether the saws were sharp. In fact, they seemed to work better after a certain amount of dulling had taken place.

Much careful research on the subject has been done by companies long in the business of manufacturing metal cutting saws. So that machine tool men may know the results of these tests and the mechanical and economic limitations of friction sawing, (and it has limits in both respects) results of tests on all sorts of materials were obtained from the DoAll Company's Laboratory at DesPlaines, Ill., and are included.

Friction sawing has proved to be an important means of separating and shaping many very hard materials. The hardness of the materials makes no difference—the melting point definitely does. So does brittleness and so do several other factors that will be developed.

In its proper sphere, friction sawing is speedy and economical. In this operation, hard coil springs are being cut into chain links.





# ELIMINATE WHEEL FORMING

SAVE TIME AND MATERIALS  
SPEED PRODUCTION

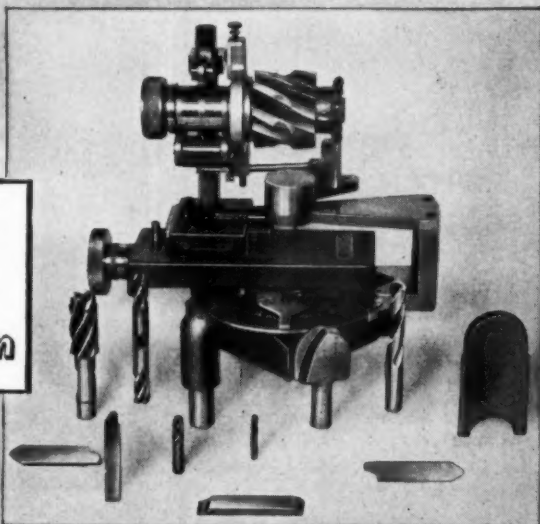


MEYERS

**Radiform**  
TRADE MARK REG.

Meyers Radiform set up to generate a radius on a helical slab mill.

Also pictured are a few standard cutting tools which have been made into "speckles" on the Radiform.



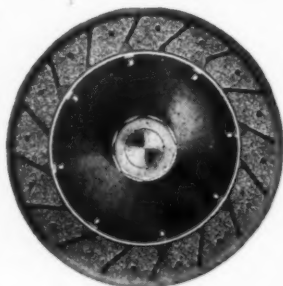
Pat. Pending.

## GENERATES CUTTING TOOLS TO ACCURATE TOLERANCES

The Meyers Radiform is unlike any other machine on the market in that it is adaptable to so many different grinding operations. Predetermined radii can be accurately generated on tool bits, milling cutters, end mills, drills and die sinking tools in less time than by any other method.

*Speed, accuracy and versatility*—a combination that makes the Radiform indispensable in any shop. Discover what Radiform can do for your shop. Write or wire today for complete descriptive literature and prices.

**W. F. MEYERS COMPANY, INC.** • Established 1888  
1012 FOURTEENTH STREET • BEDFORD, INDIANA



## SWITCH TO THIS SECTIONAL WHEEL

for  
**Improved Face Grinds**

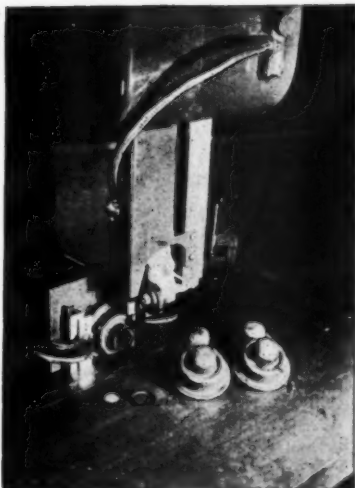
Composed of inserted abrasive sections held in a cast steel chuck. Sections may be advanced to compensate wear. The design of the wheel affords a clean, shearing, high-finish cut with ample passage for grit and lubrication.

Users of the "Bridgeport" Sectional Wheel invariably profit by:

- Faster grinding,
- Better grinding,
- More grinding per abrasive unit,
- Minimum abrasive waste in stubs,
- Lower power consumption,
- Less time consumed in replacing and resetting wheels.

These wheels are mounted in 16", 20", 26", 32", 36" and 42" chucks. May we send you complete literature?

**Bridgeport**  
Safety Emery Wheel Co., Inc.  
Bridgeport, Conn., U. S. A.



Friction sawing makes a quick job of sawing these fragmentation bomb noses.

The difference between friction sawing and conventional sawing? There's nothing mysterious, as some of its spellbinding proponents would have you believe, about it. It lies principally in the speed of band travel and pressure of feed. While the ordinary saw cuts chips and carries them out of the kerf, often operating under a coolant, the dry friction saw develops enough frictional heat in the cut to soften the material and allow the teeth to carry this softened material out of the cut. There is no flame at all. It is true certain materials will show a pinpoint glow of almost white heat at the under side of the cut and it is true also that there will be a slight skin hardness set up on the edges of the cut, sometimes penetrating the material to .002". On many materials there also will be a small burr left on the bottom of the material separated, but much less than with torch cutting methods.

DoAll engineers have found that the best type of blade for this purpose is that with a uniform size and set—not the

*a new*

# DEEP-IMMERSION

## GUSHER COOLANT PUMP

BY RUTHMAN

*IN TWO LENGTHS*



HL-15025-B  
MODEL

19 inches and 23 inches below the high level line of coolant reservoir. Model HL-15025-B has been produced to meet the need of machine tool requirements for greater tank capacity and utility of floor space. Furnished with  $\frac{1}{4}$  HP motor for continuous duty and  $\frac{1}{2}$  HP motor for extra duty, in standard current characteristics. Entire rotating assembly on heavy one-piece ground shaft is electronically balanced. Simple installation.

*Types and models available  
for every requirement.*

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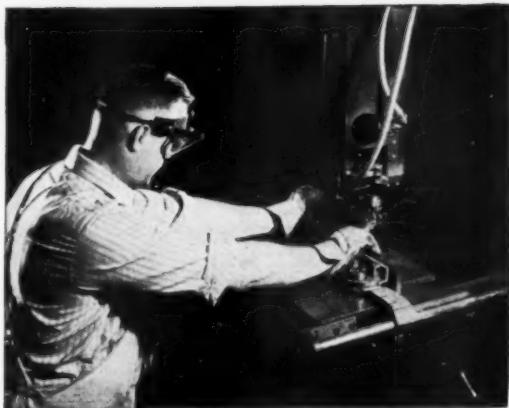
**THE RUTHMAN MACHINERY CO.**

1817 READING ROAD

CINCINNATI 2, OHIO

THE "GUSHER"—A MODERN PUMP FOR MODERN MACHINE TOOLS

Armor plate is here being cut to size with a Doall Zephyr Saw. On many similar jobs, friction sawing is proving its worth.



punched tooth or "B" tempered blade, but one with milled teeth with rather wide precision set and aligned in the manufacturing process. This is commonly referred to as the "A" tempered or reg-

ular contour cutting blade, commonly used for precision work in tool rooms. The proper selections of saw pitch and saw velocity for various materials up to  $\frac{1}{2}$ " thickness are set forth in Table 1.

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## **AUTOMATIC UNIVERSAL FLUTE GRINDER**

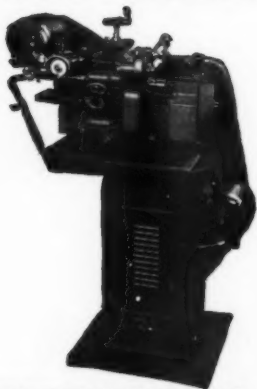
### **Grinds straight and spiral flutes from solid**

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**TABLE I — JOB SELECTOR**  
(Proper Selection of Saw Pitch and Saw Velocity According to Material Thickness).

STEELS—S.A.E.	SAW VELOCITY			SAW PITCH		
	Thickness 1/16-1/4"	Thick. 1/8-1/4"	Thick. 1/4-1/2"	Thick. 1/16-1/8"	Thick. 1/8-1/4"	Thick. 1/4-1/2"
Carbon Steel						
No. 1010-No. 1095	3000	5000	7000	18	14	10
Manganese Steel						
No. T1330-No. 1350	3000	5000	7000	18	14	10
Free Machining						
No. X1112-X1340	3000	5000	7000	18	14	10
Nickel Steels						
No. 2015-No. 2515	3000	6000	9000	18	14	10
Nickel Chromium						
No. 3115-No. 3415	3000	6000	9000	18	14	10
Molybdenum Steel						
No. 4023-No. 4820	3000	6000	9000	18	14	10
Chromium Steels						
No. 5120-No. 5150	3000	6000	9000	18	14	10
Chromium Steels						
No. 51210-No. 52100	3000	6000	9000	18	14	10
Chromium Vanadium						
No. 6115-No. 6195	4000	7000	10,000	18	14	10
Tungsten Steel						
No. 7260-No. 71360	4000	7000	10,000	18	14	10
N.E. Steels						
No. 8024-No. 8949	4000	7000	10,000	18	14	10
Silicon Manganese						
No. 9255-No. 9260	4000	7000	10,000	18	14	10
Other Steels						
Armor Plate	3000	5000	9000	18	14	10
Stainless Steel						
18-8	3000	5000	9000	18	14	10
Illium	4060	7000	10,000	18	14	10
Cast Steel	3000	5000	9000	18	14	10
CAST IRONS						
Gray Cast Iron	3000	5000	7000	18	14	10
Malleable Cast Iron	3000	5000	7000	18	14	10
Meehanite Castings	3000	5000	7000	18	14	10

Friction sawing is best accomplished, tests show, by placing a heavy uniform feeding pressure on the work. This pressure is one of the chief factors in creating the friction between blade and work. Therefore, a blade sufficiently wide to withstand such heavy edge thrusts must be used. If the work material approaches 1/2" in thickness, which is the practical mechanical and economic limit so far as material is concerned, a wide blade must

be used. This necessarily reduces the size of any radius that can be cut. With thinner sections, narrower blades can be used, with accompanying smaller radii possibilities.

Minimum width of saw blade for radius cutting of materials of varying thickness is recommended in Table 2.

Claims have been made regarding the cutting of any material of any thickness by the friction method. Manufacturers all

For marking  
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parts, seals,  
discs, in metal  
material, etc.



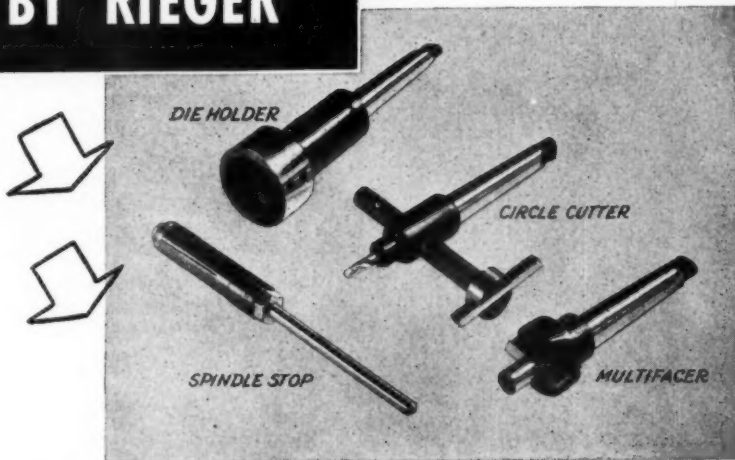
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over the world have clamored for information to help them solve problems. The navy was hopeful that the method might work in cutting 6" sections of armor plate, but all tests have proved that for the ordinary operator,  $\frac{1}{2}$ " thickness is the practical limit for friction cutting. Cuttings up to one inch thick have been made, but in saw laboratories, and not in production. Any problems involving the cutting of material thicker than  $\frac{1}{2}$ " should be referred to a good saw laboratory for tests. Such tests by the inexperienced are exceedingly dangerous.

		MATERIAL THICKNESS							
SAW WIDTH		$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$ "
	$\frac{1}{4}$								
	$\frac{3}{8}$								
	$\frac{1}{2}$								
	$\frac{5}{8}$								
	$\frac{3}{4}$								
	1"								

#### MINIMUM RADIUS

Note Saw Width Limitations According To Material Thickness On Preceding Chart

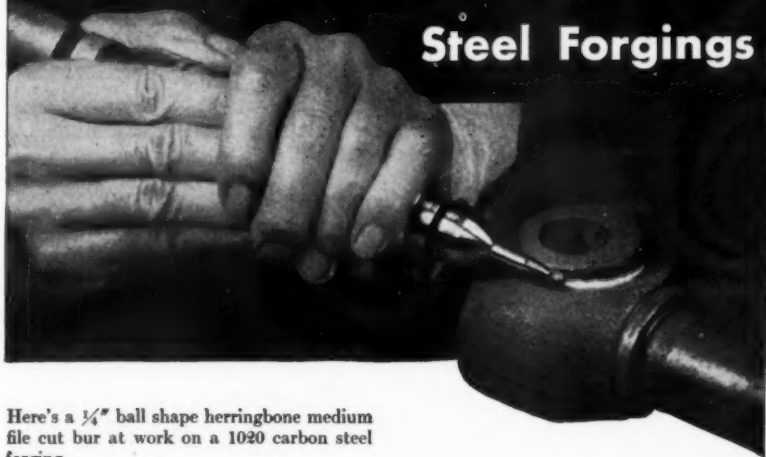
SAW WIDTH	MINIMUM RADIUS
$\frac{1}{4}$ "	$\frac{5}{8}$ "-1"
$\frac{3}{8}$ "	1"-3"
$\frac{1}{2}$ "	3"-5"
$\frac{5}{8}$ "	5"-7"
$\frac{3}{4}$ "	7"-9"
1"	9"- And Over

Cutting rates, within these size limitations, are considerably faster than those by any other method, even torch cutting, as is shown in Table 3. Long saw blade life may be expected, ranging from three hours to three days, depending upon use and material. Mention was made previously of the burr that occurs on the underside of the cut. In Fig. 4 is seen a comparison of this burr and that produced by an inexperienced torch operator. Friction saw burrs are readily removed by file, band filer, or grinding operation.

Many industrial operations have benefited from the method, as is shown in the other applications photographed, but work thickness limitations confine friction cutting to relatively thin sections, while conventional sawing is virtually unlimited so far as thickness of material is concerned.



## Use File Cut Burs on Steel Forgings



Here's a  $\frac{1}{4}$ " ball shape herringbone medium file cut bur at work on a 1020 carbon steel forging.

Why  $\frac{1}{4}$ " ball? To fit the shape of the work.

Why herringbone? For control. On this job a single spiral would tend toward "bur pull." Herringbone cut here balances the opposing "pulls." Operator can guide the bur exactly where he wants it . . . use any pressure he wants. On jobs where "bur pull" doesn't matter, a single right hand spiral works excellently.

Why file cut? For maximum bur life, and to overcome "bur bounce." A file cut bur bites through the tough skin of a steel forging, stands up under hard use.

On this type of job, best finish with maximum cutting power is obtained at speeds of 2800 R.P.M., varying with size of bur. After a file cut bur has been broken in, it should be used at slightly higher speeds.

*Tip to operators:* move the bur at an even rate and pressure. This eliminates the "hills and dales," providing a clean, scratch-free finish.

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### CUTTING RATES

LINEAR INCHES PER MINUTE

	1'10"	2'0"	2'4"	3'6"	4'8"	6'0"	8'0"	12'0"
MATERIAL THICKNESS	1/16"							
	1/8"							
	3/16"							
	1/4"							
	5/16"							
	3/8"							
	7/16"							
	1/2"							

Tubing may be cut by the friction method, but here again work thickness enters the picture. If the diameter of the tubing is large, the wall sections must be thin. If the diameter is small, the wall sections can be thicker.



Fig. 4—Comparison of the burr resulting from friction sawing and that produced by an inexperienced torch operator.

Many metals that cannot be sawed at all by the conventional methods can be cut by friction sawing, but not all. If the melting point is low enough to use the torch method successfully, the friction sawing method, in general, likewise will apply. But high melting point metals and particularly those, such as Calite, which

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the torch will not cut, cannot be friction sawed either. Up to  $\frac{1}{2}$ " of thickness, it has been found economical to friction saw. Above that it will usually be more economical to use a torch, unless some other requirement makes the torch method impossible.

Claims have been made that tungsten carbide can be friction sawed. It cannot. Its melting point is too high and it is too brittle. It will break under the shock of the saw teeth. Claims likewise have been made that glass can be friction sawed. The saw will melt the glass at the point of contact, but radial cracking and chipping is so common and constant that it renders such a method undesirable. Glass cloth, powdered mica, and similar materials, when compounded with thermoplastics, may be cut efficiently in small work thicknesses and sections, using the same technique as applied to steel, but plastics in general are not friction sawable materials. Tests thus far have shown that friction sawing is applicable almost solely to the steel and alloy group of metals. Aluminum, lead, zinc, magnesium,



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But stainless steel, armor plate, steel alloys of almost any hardness, sheet metals, and the ferrous cast materials so difficult to deal with by other means are readily cut in this way.

One point cannot be emphasized too much: Let 10,000 feet per minute be your top velocity. That is almost two miles a minute and any cutting that can be done by this method at all can be accomplished at that speed. Claims have been made of materials cut at 12,000 fpm and some engineers with little actual practical knowledge of the subject have recommended even higher speeds. The danger of saw breakage above 10,000 fpm is extreme, and when one does break it seems almost to explode. The effect on the shop and those nearby is very much like that of mortar fire.

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**Test No. 3—**Ten sheets of saw stock, SAE 1095; .008" thick, Rockwell 69-72 on 30T scale. Tests run on single sheets and sheets stacked 10 high at conventional speeds and feed pressure, then at 5,000 ft. velocity and hand pressure. Best results obtained at 5,000 fpm with a 1/2-14 blade, where rates of 112 lineal inches per minute or 112 finished pieces (cross cut saws) an hour were achieved.

**Test No. 4—**Five pieces of stainless steel, type 304 (18-8), thickness varying from 1/8 to 1/2". Best results obtained with 1-14

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**Test No. 6—Stainless steel tubing, 2½" o.d. and 1/16" wall.** Best results with ¾-10 blade at 4,000 f.p.m. and light pressure;

cutting rate, 6 to 8 seconds each cut

**Test No. 7—Tantung C, ½" thick;** best results with 1-10 blade at 8,000 f.p.m. and medium hydraulic feed. Cutting rate, .875 inch per second.

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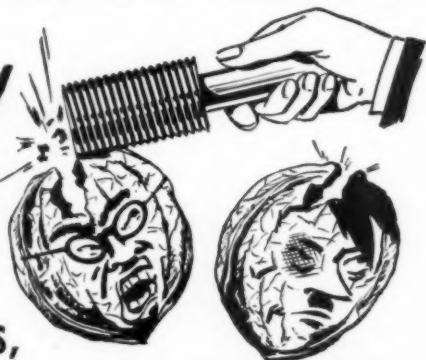
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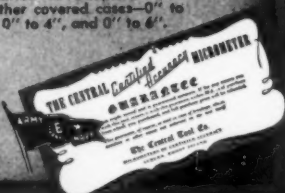
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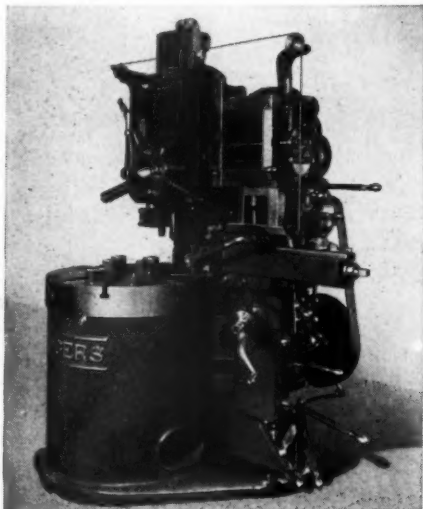
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Built into every Rogers Vertical Turret Mill are 60 years of developments and engineering achievements. These many years of accumulative experience, in cooperation with the metal working industry, are climaxed by this Rogers "Perfect 36" Mill.



Simplicity of design and universal adaptability assure:—

**LOW INITIAL COST**

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**MACHINE WORKS, INC.**

*Sales Offices:*

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**Factory: Alfred, New York  
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# PRECISION CENTERED EYE BENDING

with

## DI-ACRO BENDERS

DI-ACRO precision bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, moulding, strip stock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

Send for Catalog  
"DIE-LESS"  
DUPLICATING

showing many kinds of "DIE-LESS DUPLICATING" produced with DI-ACRO Benders, Brakes and Shears.



Pronounced "DIE-ACK-RO"

### O'NEIL-IRWIN MFG. CO.

## A Centered EYE in 1 Operation

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at a high rate of production. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.

### BENDER No. 1

Forming radius 2" app. Capacity 7/32" round cold rolled steel bar or equivalent. All DI-ACRO Benders have two-way action, right or left hand mounting and reversible forming nose.



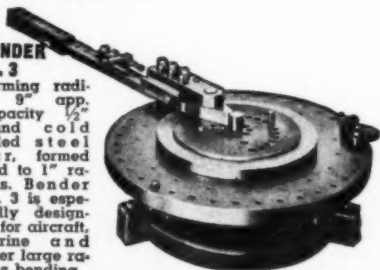
### BENDER No. 2

Forming radius 6" app. Capacity 1/2" round cold rolled steel bar, formed cold to 1" radius. DI-ACRO Benders form bus bar and other strip stock both flat and edge-wise.



### BENDER No. 3

Forming radius 9" app. Capacity 1/2" round cold rolled steel bar, formed cold to 1" radius. Bender No. 3 is especially designed for aircraft, marine and other large radius bending.



314 8th Ave. S.,  
Minneapolis 15,  
Minnesota



**"I DUG UP  
HIDDEN  
SAVINGS  
IN MY PLANT!"**

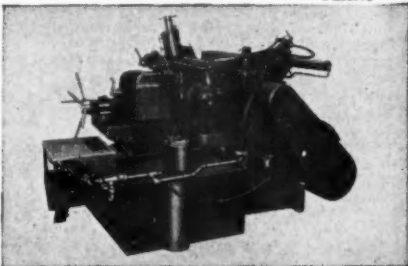
**"Once I started filtering my coolant with Hoffman equipment, I wondered why I hadn't done it long ago. It was just like finding buried treasure!"**

**Hoffman coolant filtration effects large savings in maintenance, in coolant replacement, in longer life for machines, cutting tools and grinding wheels, and in fewer rejects.**



**POUGHKEEPSIE  
PLANT**

**At right: Hoffman Model I-12VC Filter installed on Cincinnati No. 2 Centerless grinder. Other Hoffman models are available for other machines and for installation in large centralized systems.**



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**MACHINERY  
CORPORATION**  
215 Lamson St., Syracuse, N. Y.

**COOLANT FILTERS • FILTRATION ENGINEERING SERVICE**

# Let's Talk Shop

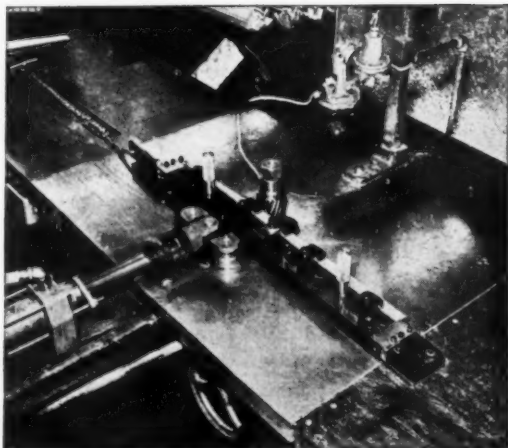
## SPEEDING PLANE PARTS PRODUCTION

**A**N increase in production of better than five times on trimming irregular edges of aircraft parts is reported at Goodyear Aircraft Corp., Akron, Ohio, thru an adaptation of a standard wood shaper, equipped with a power feed.

Prior to this development, it was necessary to feed the work thru the machine by hand, resulting in operator fatigue and a low production rate.

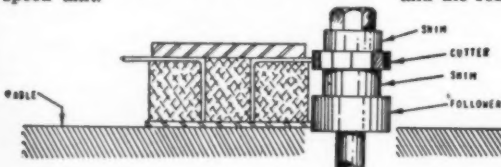
The shaper consists of a flat table with a motor driven spindle projecting thru its center, on which are mounted a cutter and a collar of the same diameter. Shaper blocks are cut to exact outline of the parts to be trimmed.

Under supervision of C. B. Mitchella, supervisor of experimental machine and tool design at Goodyear, attachments shown were installed. The power feed attachment consists of an extension to the standard shaper table. An endless roller chain is located in a groove in top of this extension. The chain passes over sprockets at either end of the groove and returns underneath the table extension where it engages with a variable speed unit.



An air cylinder with a roller arrangement on end of the piston rod is mounted on front of the shaper table and in line with spindle. A chain and hook assembly is attached to one end of each shaper block.

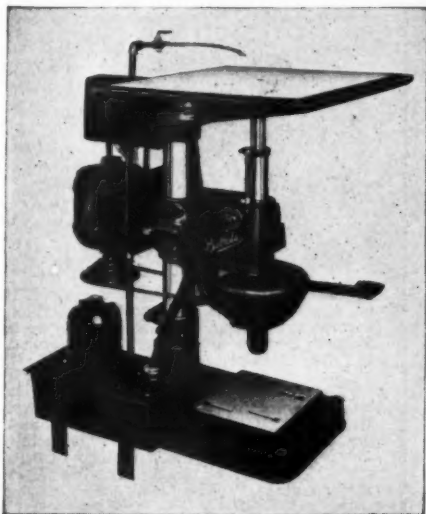
In operation, the hook is engaged in the roller which pulls shaper block by the spindle. The air cylinder is actuated and the rollers hold shaper block against



The lower collar acts as a follower for the shaper block. The block is similar to that used on a pin router in that it is of the same size as the finished part and the part is clamped to its upper surface. On the shaper, however, it is possible to trim a stack of parts up to 1½" in thickness.



# TOOL with a future!



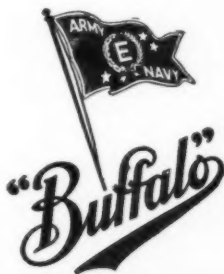
Buffalo Back Spot-facing machines "back-face" areas not accessible from the normal working position. Two models are available, for both 2 and 3 phase electrical circuits. Both models are designed to permit minor changes to suit some particular job.

When a Buffalo Back-Spot-Facer goes to work on your present production, it's really "getting-set" for a long and satisfactory post-war career.

The back spot-facer is a necessity today in the production of much war equipment—it will be an equally important "money-saver" when civilian production is resumed.

Designed to fill a definite demand for a quick-acting, easily operated machine at a moderate price, the Buffalo Back Spot-Facer fits the requirements perfectly.

Send for bulletin 3322-A today.



## Buffalo Forge Company

161 Mortimer Street

Buffalo, N. Y.

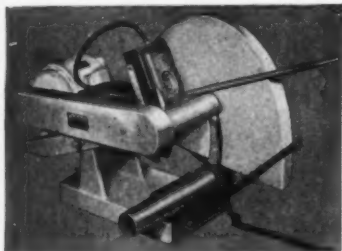
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

---

## Back Spot-FACING MACHINE

---

## THE K & S ABRASIVE CUTTER



**"Senior" Model • "Junior" Model**

### Specifications

**Senior model** specifications: Maximum sizes cut with 18" wheel 6" dia. tubing or pipe, 3 x 6" bar stock and 3½" rounds. Overall dimensions, height 24", width 19", length 40", Weight 340 lbs. Spindle dia. 1". 220 volt, 50 or 60 cycle, 3 phase 5 h.p. motor 2 v-belts, 3600 rpm.

**Junior Model** same in design and cutting speed as Senior Model. Specifications 12". Abrasive wheel cuts stock up to 3". 2 HP motor.

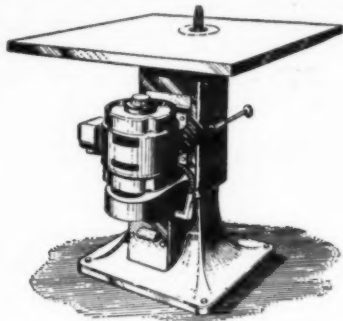
Speedy dependable tool that saves time and labor. K & S Cutters definitely increase cutting production per man. Average cutting time on metals such as 4" cast iron pipe, 2" screw pipe, stainless steel, mild steel and non-ferrous stock is only 3 to 6 seconds. Fully equipped with safeguards and protective devices. Easy to operate. Send for full details.

**Manufactured by**

**Korn Machinery & Tool Co.**

1412 South Orange Grove Avenue  
LOS ANGELES 35, CALIFORNIA  
Telephone WEbster 3-1414

spindle with the proper pressure, adjustable with a regulator in the air line.

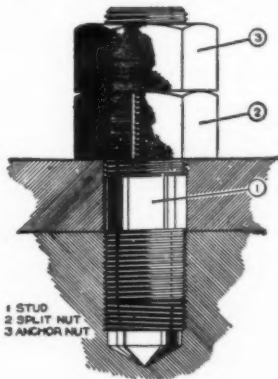


The shaper has been used successfully on trimming edges of extruded sections, formed sections and parts that have been formed from aluminum alloy sheet on the drop hammer or forming press.

The famous Corsair fighter plane is built complete by Goodyear Aircraft Corp. In addition to this plane, the Akron aircraft plant makes important parts for about 20 other Army, Navy, Marine Corps and RAF planes, including the B-29 Superfortress.

### STUD REMOVING

A selflocking jam nut is used at General Electric's Erie Works to remove studs without damaging the threads.



Here is the New Welding Publication  
that EVERY MAN interested  
in welding SHOULD READ



and here is *WHY* you  
should send for it *TODAY!*

EUTECTIC Low Temperature Welding is NEW! It is one of the most revolutionary welding developments of modern times.

Joints welded with EUTECTIC Low Temperature Welding Rods are smoother, stronger, better color matched and more machinable than those obtainable by any other welding or brazing process.

No special skill is required. All standard methods of heating are employed: gas—arc—furnace and others.

Be the first to introduce the EUTECTIC Low Temperature Welding process and its great advantages into your company. Write for your copy of *The Eutectic Welder* TODAY! Fill in and mail the coupon or write on your company letterhead and your copy will be sent FREE by return mail. Thereafter you will receive it regularly every month.

These features each month keep you posted on all developments and up-to-the-minute welding news

- \* WELDING METALLURGY
- \* WELDING DESIGN
- \* PRODUCTION IDEAS
- \* SALVAGING TOOLS
- \* NEW MAINTENANCE IDEAS
- \* USEFUL TRICKS AND TOOLS

## EUTECTIC *Low Temperature*

WELDING RODS

SENT FREE  
on request

Eutectic Welding Alloys Co., 40 Worth St., N.Y. 13, N.Y. Room 1109 B  
Please send me the latest issue of *The Eutectic Welder* and place my name on your regular mailing list.

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City \_\_\_\_\_

## DON'T WASTE OLD TAPS REGRIND THEM



### READING TAP GRINDER

Can be used on almost any type of tool and cutter grinder, surface grinder—even bench lathes. Tap is held in chuck—may be sharpened after center is destroyed. No collets. Complete. No extras. Write!

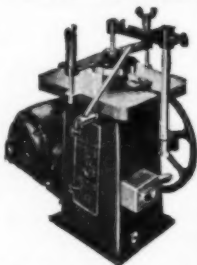
- Built-in chamfer protractor.
- Simple shifter for 2-3-4 flute taps.
- Variable relief thru adjustment screw.
- Easy - to - follow chamfer diagram on index plate.
- Capacity to  $\frac{3}{4}$ " hand tap.

ORDER NOW!

★ ★ ★

## READING BROACH KEYSEATER

The Reading Bench Machine does not require bushings or guides. No other machine like it. Very fast capacity from  $\frac{1}{8}$  to  $\frac{3}{8}$  inch cutter. Low first cost — prompt delivery.



### READING MACHINE CO.

READING (CINCINNATI) OHIO

Two standard nuts—one slotted lengthwise—are backed against each other. The pressure of a wrench on the split nut binds it to the stud threads, providing extra friction by which the stud may be removed. The second nut is used as an anchor.

### WIRE CUT-OFF DIE

The die shown is used at the Sunbury Plant of Westinghouse Electric & Mfg. Co., to cut off to desired lengths, the wires on resistors and capacitors.



Top face of the die is divided into steps ranging from approximately  $\frac{1}{2}$  to  $1\frac{1}{8}$ " deep. A hole, large enough to take the maximum diameter wire to be cut, is

For  
Fast, Accurate  
Metal-Cutting

Use  
**KENNAMETAL** CEMENTED  
TOOLS, BLANKS, and MILLING CUTTERS CARBIDE



**KENNAMETAL** Inc.

LATROBE, PA.



# CONTINENTAL

## CARBIDE TIPPED *Cutting* TOOLS

Whether it's a single or multi-tipped tool, whether or not you have a print of the specific tool you need, Ex-Cell-O can give you exactly what is required in a tungsten carbide application . . . Write for Bulletin No. 11132.

### EX-CELL-O CORPORATION, DETROIT 6



*Precision* MACHINE TOOLS • CUTTING  
TOOLS • AIRCRAFT AND MISCELLANEOUS PARTS

# NEW Angle Adaptor



Converts any drill press into a versatile multi-purpose machine.

Permits any spindle angle . . . at any height . . . horizontally or vertically.

Simplifies clumsy operations . . . speeds production . . . eliminates operator fatigue.

Makes burring, sanding, buffing, grinding, angle drilling, polishing, rotary filing, wire brushing, tapping, reaming, honing, etc., more convenient, twice as fast!

Adaptable to all drill presses with tubular columns . . . rigid construction . . . **POSITIVE LOCKING.** Write now for descriptive literature, details.

**NOBUR MANUFACTURING CO.**

912 North Orange Drive  
Los Angeles 38, California

drilled thru the face of each step to the shearing side of the die.

Operator places wire into the hole in the step where it will be cut off to the desired length. The wire is placed far enough into hole to allow the resistor or capacitor to rest against the front face of the step; this leaves the exact length of wire in the die and causes the excess, protruding at the back, to be cut off when the shear blade comes down. Since the press runs continuously, the wires are cut off as fast as the operator can put them in and take them out of the die.

In the lower righthand corner are shown some resistors, each of which has one end left uncut and one end cut off to uniform length.

## SMALL ROUGHING TOOLS

A line of smaller size, highly shock-resistant tools designed particularly for steel roughing work, including use on older machines, has been added to its standard stock tool line by Carbology Co., Inc., 11139 E. 8 Mile Ave., Detroit 32, Mich.

The tools which range from  $\frac{3}{8}$ " to  $\frac{3}{4}$ " in size will employ Grade 78C Carbology cemented carbide, designed specifically for roughing cuts and interrupted cuts on steel. The tools are available in a number of styles for individual sizes.

## CHROME GAGE BLOCKS

The manufacture of chrome-plated Johansson Gage Blocks, discontinued to meet production requirements for their regular steel Gage Blocks, has been resumed by the Johansson Div., Ford Motor Co., Dept. MT, Dearborn, Mich.

In accordance with previous arrangements, worn sets of Johansson blocks may now be returned to the factory, on an exchange basis, for new chrome-plated sets. Any blocks between .050 and 4" can be surfaced accurately with chrome-plating. A recent bulletin includes a new price schedule.



## WADE ENVELOPES

protect  
Shop Orders, Drawings,  
Blueprints, etc.

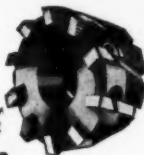
Made in three styles, transparent, fibre, and metal backs. Non-inflammable acetate windows. Special style or size to order. Write for details.

## WADE INSTRUMENT COMPANY

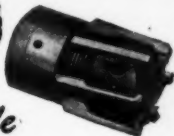
Phone: CEDAR 4728  
1422 E. 109th St., Dept. H, Cleveland, Ohio

**McCrosky***Jack-Lock***MILLING CUTTERS**

Face, Half-Side, and Staggered Tooth Milling Cutters featuring McCrosky's exclusive, nationally recognized Jack-Lock wedge that holds the blades rigidly and solidly yet permits easy, quick release for adjustment, regrinding or replacement. Send for Bull. 16-M.

**McCrosky***Super Adjustable***REAMERS**

Chuck or shell types. Straight or spiral mounted blades are held rigidly with McCrosky's time-tested shop-proved pin and screw locking device, assuring easy and uniform adjustment,—and regrinding with minimum loss of blade stock. Send for Bull. 16-A.



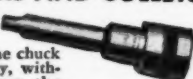
# Cut your costs with McCrosky TOOLS

**McCrosky***Block Type*  
**BORING BARS...**

Featuring McCrosky's exclusive, patented centralizing V-lock that centers and holds the cutter blocks accurately and rigidly, yet permits the operator to change the block easily, and to "float" with extreme accuracy the block used in making finish cuts. Send for Bulletin 16-B.

**McCrosky***Wizard*  
**CHUCKS AND COLLETS**

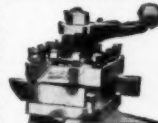
... permit the collets to be latched and centered rigidly in the chuck and released easily, without slowing down the spindle, thus making multiple tool jobs continuous, and permitting machine tapping, at high speed, on drill press or lathe without danger of tap breakage. Send for Bull. 16-D.

**McCrosky***Special*  
**MULTIPLE DUTY TOOLS**

... combine related facing, boring, counterboring and reaming operations, permitting 3, 4, 5 or more operations to be done simultaneously with just one tool, speeding up production, and cutting costs. Each tool engineered to the individual job. Suited for long or short runs. Send for Bulletin 17-S.

**McCrosky***Turret*  
**TOOL POSTS...**

Mounted on the T-slot of the compound rest, or bolted on the main slide, McCrosky turret tool posts enable the operator to handle successive operations without stopping for tool changes,—give engine lathes the versatility of turret lathes. Square and hexagon designs. Send for Bulletin 16-E.

**McCrosky****TOOL CORPORATION**  
MEADVILLE, PA.**COST CUTTING TOOLS***Designers and Manufacturers of**Jack-Lock MILLING CUTTERS**Block Type BORING BARS**Wizard CHUCKS AND COLLETS**Super Adjustable REAMERS**Turret TOOL POSTS*

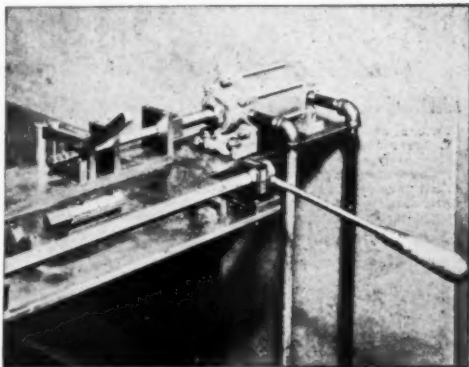
## BROACHING AND SIZING FRAME MEMBERS

A new method of sizing and removing burrs on the insides of square tubular steel frame members, devised at General Electric's Schenectady Works, does a better job much faster than any previous method.

The frame members have outside dimensions of approximately  $\frac{1}{2}$ " and walls  $\frac{1}{32}$ " thick. They are cut in 19" lengths, then drilled in several places. The drill causes a burr at each break-thru point on inside of the tube.

One end of the frame member must accommodate a steel shank which fits snugly into the opening, and at a point where a burr has been caused by drilling. Consequently, this burr, which is located approximately  $\frac{1}{2}$ " from open end of the frame members, must be removed. Also, the opening must be properly sized since square tubular stock has a tendency to vary slightly.

Considerable difficulty was experienced with the former method in removing the

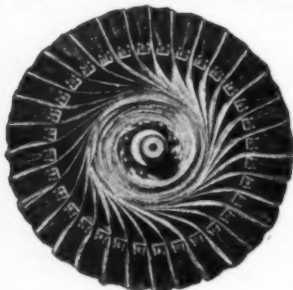


burrs and sizing the tubes, the operations being rather slow and expensive.

In the new method of processing these frame members, V-blocks, in which the part is placed, are mounted on a steel table. These position the piece in such a way as to facilitate sliding the open end

---

## THE VONNEGUT BRUSH-BACKED ABRASIVE HEAD



Vonnegut Brush-Backed Abrasive Head, with end cap removed, showing 32 strands of magazine-loaded abrasive cloth with ends extending along-side of 32 radially projecting brushes.

Yielding action of the brushes forces the shredded ends of slashed abrasive cloth to follow over curves and into corners when irregularly shaped work-pieces are brought into contact with the revolving head.

Chances are that you have some deburring jobs, or other clean-up work in preparation for final finishing operations for which you would find this new type abrasive head to be an ideal solution.

*Ask for Bulletin No. 52 regarding the Vonnegut Brush-Backed Abrasive Head. Write to:*

**VONNEGUT MOULDER CORP.** 1805 MADISON AVENUE  
INDIANAPOLIS 2, INDIANA

---



**TAKE A SHORT LOOK**  
**AT THIS LONG CHIP**

**...and you'll see why Morse Tools  
cut costs so consistently!**

To produce chips like these, drills must be precision-made...be accurately ground...have uniformly-dimensioned, uniformly-angled cutting edges, always with proper lip clearance. Obviously, that's how Morse Drills are made. That's why there's less spoilage, less down-time...that's why costs usually drop...when plants start using Morse Drills. Start using Morse Tools yourself!

**TO REDUCE COSTS, SPECIFY MORSE CUTTING TOOLS**

**MORSE**

**THERE IS A  
DIFFERENCE**

**NEW YORK STORE: 130 LAFAYETTE ST. - - - CHICAGO STORE: 370 WEST RANDOLPH ST.  
SAN FRANCISCO STORE: 1180 FOLSOM ST.**



**ONE UNIVERSAL HIGH QUALITY**

**TWIST DRILL AND  
MACHINE COMPANY**  
NEW BEDFORD, MASS., U.S.A.

## HYBCO GRINDING HEADS

For Universal Tool and Cutter Grinders

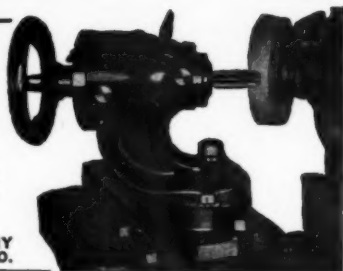
### CHAMFER SHARPENING HEAD →

Accurately Relieves Chamfers of TAPS—STEP DRILLS—CORE DRILLS—COUNTERSINKS—similar tools with evenly spaced flutes.

### ← FLUTE SHARPENING HEAD

Sharpens Straight or Angular Flutes—GUN OR SPIRAL POINTS OF TAPS—Other tools with evenly spaced flutes.

Write for Circular MTH  
**HENRY P. BOGGIS & COMPANY**  
1279 W. 3rd St., Cleveland 13, O.



over a broach also mounted on table) which is approximately  $1/16"$  smaller than opening. The piece is held firmly in place by a hand-operated lever which, when depressed, brings pressure to bear against frame member from above (where burr is located), wedging that portion of the piece against the broach. The broach is then withdrawn rapidly from the piece, its cutting edge shearing off the burrs as it passes over them. The broach is powered by air, regulated by a two-way pneumatic cylinder which, in turn, is controlled by a foot-operated valve.

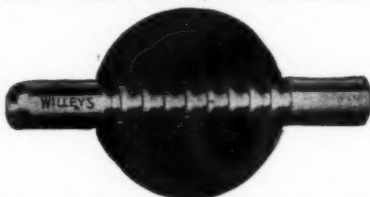
Another set of V-blocks mounted on the table positions frame member for sliding over a gage (also mounted on table) which checks size of open end of the piece.

A third set of V-blocks accommodates the part for sizing if found undersize. The sizing tool is a cam-type expansion device operated by a hand lever, which when fully depressed, will cause this tool to expand to the required inside dimensions of frame member. The piece is positioned over this tool in the same manner as it is placed over the broach and gage.

This method has resulted in more uniform quality as well as faster and better operation.

## WILLEY'S METAL BROACHES

An exclusive application of Willey's Metal is the manufacture of solid Tungsten Carbide broaches, such as illustrated.



ed. These are now made in diameters of from .250" to 1" and moderate lengths by Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit 1, Mich.

## INDUSTRIAL ELECTRONICS

An interesting new 44-page bulletin (GEA-4309)—"Fundamentals of Industrial Electronics" has been published by the General Electric Co., Schenectady, N. Y. It comprises a series of eight articles by G. M. Chute, Application Engineer and is illustrated with numerous photos and diagrams. Copies will be sent free on request.

## The Easy Way to Carry Any Load

### PORTELVATOR

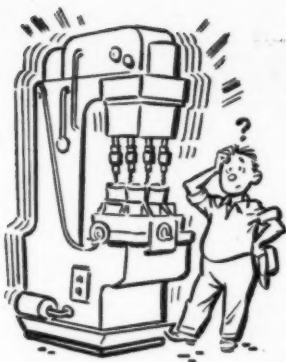
(Elevating Table)

You don't need human "pack horses" in your plant . . . one man or boy can push things around on PORTELVATOR. Use it, too, for overhanging work, work bench, lifting, stacking and many other purposes.

**THE HAMILTON TOOL CO.**  
Ninth and Hanover Streets.  
**HAMILTON OHIO**

Write for  
details and  
Bulletin.





## **A SURE CURE FOR JITTERY MACHINERY**

Machine tools are getting excessively hard use these days. If any of yours are worn and out of alignment, you CAN produce true and accurate holes with the

# **GLENCO**

## **Floating Tool Holder**

Actual compensating movements under load achieve positive correction of misalignment on hand and Automatic Screw Machines, Garvin Tapping Machines, Adjustable Multiple Spindles, Tapping Machines of all types, Drilling Machines, all types.

Capacities up to 5" tool diameters in stock. Special or larger holders made up promptly. Only 11 parts, all interchangeable, all hardened and ground to close tolerances so wear is negligible.

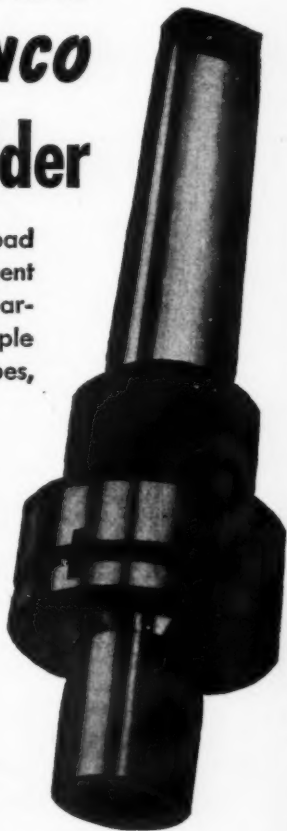
### **30 DAY TRIAL OFFER**

Any stock size will be sent you for your inspection and test for 30 days, subject to return if unsatisfactory.

## **The J. C. GLENZER CO., Inc.**

6465 Epworth Blvd.

Detroit 10, Mich.



## RIVETING FIXTURE

The illustration shows a bench type punch press at the Sunbury Plant of Westinghouse Electric & Mfg. Co., on which is mounted a riveting fixture that facilitates assembly when many rivets are located in various positions on a common center line.

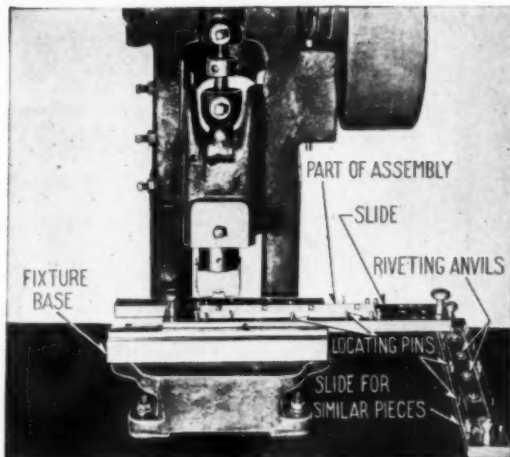
Base of the fixture is fixed on the press table; nested in the base, directly under center of the punch, is a ball bearing backed up by a spring.

Bottom side of the slide is counterbored under each rivet location so that, as slide is moved, the ball bearing rises into a counterbore and locates assembly in a riveting position. A riveting anvil is mounted on the slide at each rivet position. Locating pins on the slide position pieces to be riveted.

The operator makes the assembly and places it in the fixture. As assembly is moved towards the left, it is located in the first riveting position by the ball bearing rising into the counterbore. The press is then operated and rivet is headed; this is repeated until assembly is completely riveted.

The punch serves a twofold purpose—it presses parts of assembly together before riveting to insure a tight fit, and then it heads the rivet.

In the lower righthand corner is shown a slide made for parts similar to the one in the press. A complete fixture need not be built for each job because slides

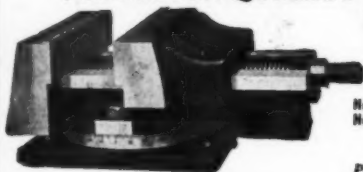


for various jobs may be built for use in a common base.

## FLEXROCK ACQUIRES LUBRALOY

All patents and formulae pertaining to the Lubraloy Process of Self-Lubricating Packing, have been acquired by Flexrock, manufacturers of flooring, water and weather-proofing, roofing and other building maintenance materials. Just as soon as new equipment can be installed, the Company will start producing the entire Lubraloy Process Packing Line, which includes a packing for every use. Every one interested in a new idea in packing, which includes self-lubrication and many other features, is invited to write to Flexrock Co., Dept. IM, 3634 Filbert St., Philadelphia 4, Pa.

## SUPERIOR QUALITY AND WORKMANSHIP IN PLUNKET VISES



**SQUARE BASE SHAPER VISE**

The Shaper Vise has graduated swivel base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

No. 40, 10" jaws, 2 1/4" deep, opens 8 1/4". Weight 125 lbs. .... **\$52.00**

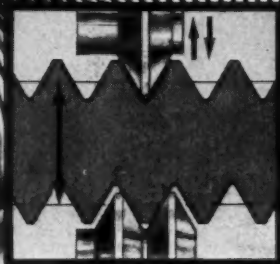
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Our complete line includes Vises for Drill Presses, Milling Machines, Shapers and Grinders.

Prices are net, f. o. b. Chicago. Write for illustrated folder today. Dealers inquiries solicited.

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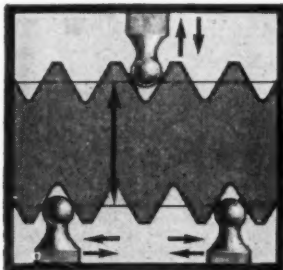
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MODEL 45B-100. The upper, sensitive roller contact actuates the Dial Indicator.



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20 minutes each. For instruction and training.  
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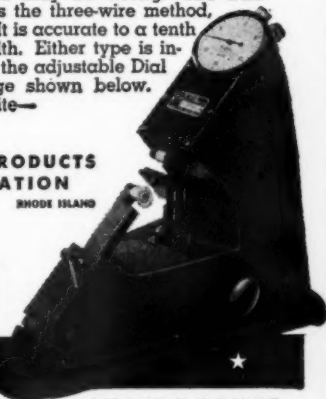
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No conventional type of gage, whether ring gage or roller-type snap gage, can tell you so **definitely** and so **quickly** the degree of accuracy of a pitch diameter as these two types of Dial Indicator Gages. Neither depend upon the uncertain sense of touch.

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PRECISION MEASURING INSTRUMENTS

## STANDARD SURFACE-ROUGHNESS SPECIMENS

A set of standard surface-roughness specimens, each representing one clearly identified degree of surface roughness ranging from the smoothness of a bearing surface to the roughness of a flame cut, has been announced by the Special Products Division of the General Electric Co.

The new specimens are designed to permit the engineer or draftsman to select and specify by symbol the especial degree of surface roughness allowed for a particular machine part. They are also desirable for use in the shop to enable mechanics to determine the exact surface roughness allowed by drawings.

The set consists of 10 metal specimens, each approximately  $2 \times 2 \times \frac{1}{8}$ " in size. Several of the specimens are divided into two and in some cases four surfaces, all of which, while equally rough, are produced by different machining methods. In all, the 10 specimens simulate 25 surfaces, each surface representing the roughest one acceptable for that particular symbol regardless of the method of producing the finish or material of which the part under inspection is made. The specimens are furnished in an attractive cloth-lined wooden case, designed for protection and for convenience in handling.

Little experience is required to use the specimens efficiently, since comparison of the surface under inspection with that

of the selected specimen is made visually and by sense of touch.

### AIR POWER BULLETIN

Ingersoll-Rand announces publication of a new 24 page, two-color booklet entitled, "A Little Air Power Will Do Many a Big Job".

Mainly photographic in format with a minimum of text, it is designed to be a useful addition to every shop man. It is a book that will be opened frequently for its "easy to get" ideas in the many illustrations. In fact, it is a virtual clearing house to enable production men to benefit from one another's ideas and to show what is being done with small compressors or with a small amount of air from a shop air line.

Nearly 70 photographs show how to put familiar air-operated equipment to work in new ways or use compressed air to increase production and obtain greater economy. Several ingenious "Rube Goldberg's" that can easily be made in the shop are illustrated.

Three pages briefly show models of the well-known Type 30 Air-Cooled Compressor, and two pages are devoted to a quick summary of the larger Ingersoll-Rand Compressors and Blowers which range in size up to 3000 hp.

Copies of the booklet, catalog 1011, may be obtained by writing or phoning the company at 11 Broadway, New York 4, N. Y., or any of its service branches throughout the country.



### NEW LOW COST DRILL GRINDER

Anyone can do expert drill grinding with this simple-to-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time



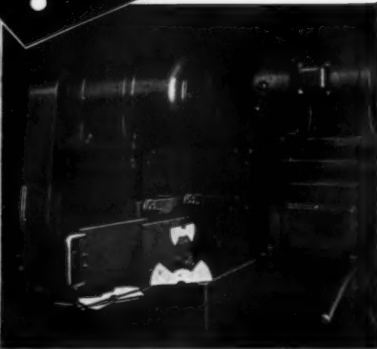
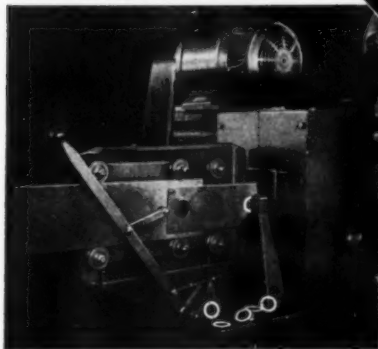
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Kansas City, Mo.

and materials that dull bits waste. Grinds bits from  $\frac{3}{16}$  to  $1\frac{1}{4}$ . Write for FREE literature.

Bothered by  
parallel-surface  
grinding  
problems

?

GARDNER-GRINDING  
is *often the answer*,  
as in these two cases!



CHECK the possibilities of GARDNER DOUBLE-GRINDING on your parallel-surfacing operations. Results from these modern tools may amaze you.

These machines are built in hand-operated types, as shown here, OR with semi-automatic attachments and fixtures, for higher production.

They produce accuracies in "tenths", when needed, as on the job at the left, or ordinary tolerances, as on the work seen at the right.

AT LEFT: Thin copper alloy washers,  $2\frac{1}{4}$ " O.D.,  $1\frac{1}{2}$ " I.D., x.045" thick, are finish ground after hardening, on a Gardner No. 125-23" PRECISION Grinder. A roller gun-type sliding fixture produces 4 to 6 pieces per minute. Tolerances: .0002" to .0003" for parallelism.

AT RIGHT: Meter blades, of special alloy cast iron, ground on a Gardner No. 120A-20" machine with roller gun-type sliding fixture. Production: 30-40 pieces per hour, based on .060"-.070" overall stock removal. Tolerances: .002" for parallelism and uniformity.



Write today for data on GARDNER DOUBLE-GRINDING!

**GARDNER MACHINE COMPANY**

436 East Gardner Street • • • Beloit, Wisconsin, U.S.A.

## PISTON RING INSPECTOR

An Electronic Piston Ring Inspector has been designed by engineers of The Sheffield Corp., Dayton, Ohio, to eliminate the human element in checking piston rings. The instrument automatically inspects trueness of periphery and width of gap of a specific size of piston ring.

The ring to be checked is inserted inside a master ring of correct dimensional quality which is placed on instrument table and rotated by a power-driven roller. Gaging functions are performed by scanning beams of light directed onto photo-electric cells which energize electronic circuits to illuminate three signal lights.

As the ring revolves, one beam of light is projected on periphery of piston ring. A clearance between it and the master ring will result from any out-of-round condition of ring, permitting part of light beam to fall on photo-electric cell. This cell is set to actuate a red rejection signal should an



excessive amount of light indicate piston ring is out-of-round beyond an acceptable point.

Should periphery be within tolerance limits, a green signal will flash on at end of one complete revolution provided width of gap is also within tolerance, or a yellow signal will show if gap is undersize. The beam of light is interrupted by a mechanical shutter arrangement at time gap is passing this point.

Another beam of light scans width of gap, photo-electric cell being set to actuate a yellow signal should gap be undersize. A third beam of light energizes another photo-electric cell set to illuminate red rejection signal should width of gap be oversize.

Master piston rings of known dimensional quality are used in adjusting instrument for desired tolerances. The in-

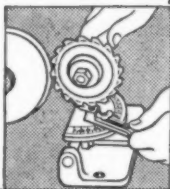
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# MACWHYTE WIRE ROPE SLINGS help avoid production delays!

Here is a Macwhyte ATLAS Braided Type 1 Sling. It is made to any length in strengths from 2 tons to 235 tons. It is exceptionally lightweight for its great strength, and very easy to handle due to its flexible, braided 8-part wire rope body.

Labor-saving, time-saving, patented Macwhyte Wire Rope Slings handle difficult loads easily, quickly, safely. They are custom-built in the size, style, and length you need.

Macwhyte Sling Engineers will help you plan the sling best suited to your requirements.

## Send for Sling Catalog!

This helpful book gives reliable strengths and safe loads of Macwhyte Slings, plus other sling information and pictures. Write your request on

your company letterhead to Macwhyte Company, Kenosha, Wisconsin, or any Macwhyte distributor.

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strument can be adapted to various nominal sizes, gaps of varying width, and also for variations on allowable out-of-roundness of periphery. Trueness of the periphery can be determined within a tolerance of .0001".

With this instrument, inspection cycle per piece is less than 5 seconds, and production rate is determined by speed at which rings are presented to gage. In all cases, inspection will be much faster than can be accomplished by present hand-checking methods.

## BLANCHARD HANDBOOK

"Work Done on the Blanchard" is the title of an 80-page handbook recently published by the Blanchard Machine Co., 64 State St., Cambridge, 39, Mass. This handy, convenient size booklet presents typical examples of the machining and finishing of all manner of flat surfaces by Blanchard grinding.

Materials now being ground include the usual ferrous metals; many non-ferrous metals such as aluminum, magnesium, copper, brass, bronze; also glass, carbon, plastics and minerals such as quartz, agate and sapphire. There are many illustrations of typical jobs.

The purpose of this booklet is to help acquaint readers with the wide application and versatility of Blanchard grinding. Wheel data appears in the index. Copy will be mailed gratis on request.

## MEEHANITE BULLETIN

A 4-page bulletin entitled "Meehanite—the Metal for Heat Resisting Castings" has been prepared by the Meehanite Research Institute of America, Inc., Pershing Square Bldg., New Rochelle, N. Y. Known as Bulletin No. 21, it illustrates typical applications of various special heat resisting Meehanite Castings and also tabulates various property data. A copy will be mailed upon request.

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Your Own Small Parts...

## SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

- 1 Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
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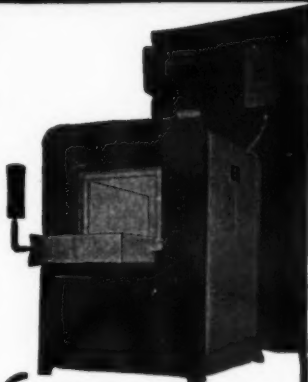
### AVAILABLE IN TWO SIZES

Type	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3	8"W 6"H 14"L	29.6	3400	14.8	\$124.00*
MH-4	10"W 6"H 18"L	....	4800	20.9	\$191.00*

\*Includes Hearth Plate

**MAX. SAFE TEMPERATURE**—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

**AUTOMATIC CONTROL**—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—\$152.40.




**REPLACEABLE HEATING ELEMENTS**—Replaceable nickel chromium resistors embedded in rectangular refractory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

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● The high overall efficiency and wide range of applications of this powerful MALL Grinder will quickly repay its original cost. It combines constant high wheel speed with ball-bearing mounted straight and angle spindles to assure swifter, smoother wheel action, longer tool life, fewer rejects, and a faster cleaning and finishing rate.

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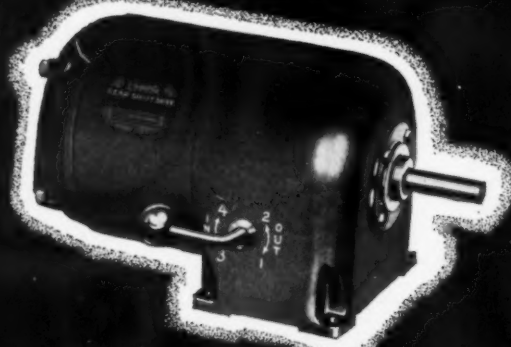


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**GEARSHIFT DRIVE LINE**



*In 1/2 and 3/4 hp Capacities*  
for smaller machine tools requiring less than 1 hp  
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1 hp to 25 hp



**THE LIMA ELECTRIC MOTOR CO.**

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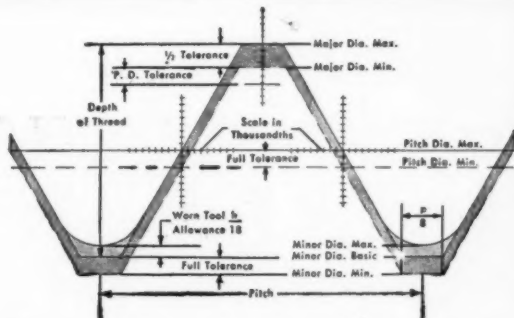
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# WHAT'S NEW IN METALWORKING

## NORTON 4" TYPE C CYLINDRICAL GRINDER

**N**ORTON Co., Worcester, Mass., announces a new 4" Type C cylindrical Grinder. Available in 12 and 18" lengths, this machine is primarily designed for short length, small diameter work.

An important feature of this high production, precision grinder is that all controls and adjustments can be made quickly and easily.

Makers point out that this machine should be extremely valuable in the airplane, automotive, and instrument parts industries, especially in the manufacture of small machine parts where high production is essential to meet future postwar competition.

Hydraulic table traverse, automatic infeed of the wheel at each table reversal and adjustable dwell at each end of the table traverse are standard arrangements. The machine is available as plain or semi-automatic with manual or automatic cycle. Where a semi-automatic machine is desired, continuous wheel feed can be furnished. Work speeds are from 100 to 1000 rpm. Grinding wheels 16" in diameter and up to 3" wide are available for this machine. Other features include Norton wheel spindle with automatic lubrication and automatic coolant controls.

Maximum floor space occupied by the longer machine is approximately 75" long by 55" wide.



## DENISON MULTIPRESS

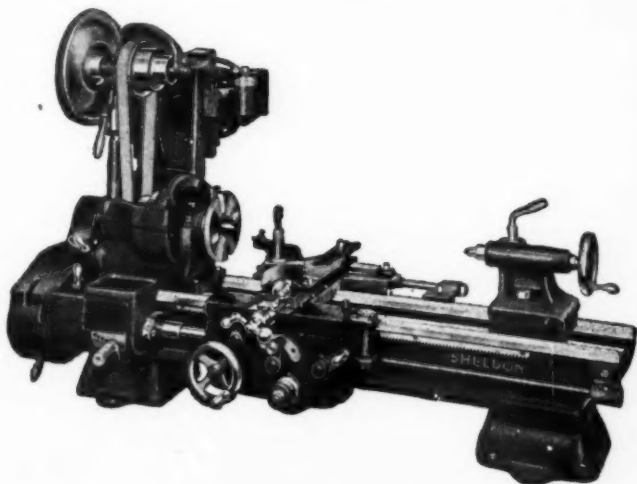
Recently introduced is a versatile, compact, self-contained bench type hydraulic press, adaptable to many operations thru numerous accessories and fixtures. Incorporating advantages of oil hydraulic power, the press offers ram speeds of 200" per minute downward and 300" per minute upward.

This useful new industrial tool, manufactured by the Denison Engineering Co., 1160 Dublin Rd., Columbus, 16, Ohio is ruggedly built for any single or production-line operation within its pressure range. Pressure and stroke limits are easily adjusted—any length stroke from 1/16" to 6". It is simple to install, easy to



# SHELDON

## PRECISION LATHES



Among moderate priced lathes, the SHELDON 1026 BMWQ is not only superior in design, workmanship, features and precision, but in its convenient, space-saving and more efficient overhead motor drive . . . .

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SHELDON MACHINE CO., INC., 4242 N. KNOX AVE., CHICAGO 41, U.S.A.



## PUTTING THE HEX ON TRAIN-WRECKS

These small, metal pieces are a part of a new intra-train communication-system. Involving accurate stamping, tapping, and machining, they are typical of Ace facilities for fast, dependable production on small parts and assemblies.

**REPLY ON ACE FOR PRECISION GRINDING** Centerless, Internal Cylindrical, External Cylindrical, Blanchard Surface, Plain Surface, and Thread Grinding.

**PRODUCTION MACHINING** Turning, milling, drilling, cutting, tapping, and threading of small machine parts that require precision grinding—on a mass-production basis.

**METAL STAMPING** Blanking, forming, and extruding of small metal parts on presses up to 75-ton capacity. Spot welding, sub-assemblies and assembly of intricate radio and machine parts.

**HEAT TREATING** Electric and gas furnaces, individually pyrometer controlled, for high-heat, quenching, and carburizing of parts up to approximately 10" x 10" x 15".

**TOOL AND DIE WORK** All operations for the production of Punches and Dies for small stampings, for Jigs, Fixtures, Gages, Moulds, Form Blocks, Tool Bits and Circular Form Cutters.

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**ACE MANUFACTURING CORPORATION**  
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operate and adjust, economical to maintain. The machine offers generous working space—11" from bed to ram; 10½"x16" bed, 6" from centerline of ram to face of throat. Dual hand controls and pressure gauge assure safety for the work and the operator. When both levers are depressed simultaneously, the ram moves downward. If either lever is released, the ram stops. If both levers are released, the ram rises immediately to its upper limit, where it is positively held until the levers are again depressed. The ram can be fingertip-controlled to descend rapidly, or brought slowly downward and the work positioned accurately beneath it. Pressure can be applied in full at once, or increased gradually.



The press is small considering its capabilities and streamlined . . . 16" wide, 26" deep, 34" high, weighs 725 lbs, and will deliver any working pressure from 300 to 8,000 lbs downward; 5,000 lbs. upward.

Additional Multipress accessories are now being developed for a wide range of jobs and further information may be had by writing the manufacturers.

### WET BELT SURFACER

A new BG-8 Wet Belt Surfacers with Automatic Feed Table is being introduced by Porter-Cable Machine Co., 300-1 Exchange St., Syracuse, 8, N. Y. An 8-page, booklet contains numerous pictures of various applications and features. The

# LET'S STUDY THIS GRINDING WHEEL BOND PROBLEM TOGETHER

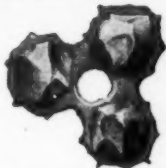


Bond, in a grinding wheel, is the "cement" that holds the abrasive grains together. There is a difference between a bond's toughness and strength. For example, a pane of glass may have great strength, but shatter readily upon impact. A grinding wheel's bond must be strong to produce extra grinding hours, yet it must not shatter and release the abrasive grains before they have become dull. To develop proper strength, elasticity, and friability of bonds is the function of Sterling's laboratory technicians.

Different metals demand different grinding wheel bonds. Because Sterling men have spent years in investigation and solution of literally thousands of different grinding problems, the selection of the proper bond for your "Wheels of Industry" can now be accomplished with scientific accuracy.

Some of Sterling's bonds are years old . . . they have stood the test of long use. Some have been recently introduced . . . these fill a new need. Collectively, Sterling's bonds offer a wide range of possibilities for the quick solution of your grinding difficulties. There is Sterling's T Resinoid Bond for surfacing operations . . . Sterling's P Resinoid Bond for snagging all types of steel, gray iron, brass, etc. There is Sterling's "25" Bond, used so successfully in Sterling's New EasyMount Wheels for carbide grinding. There are many others (the selection is almost unlimited) from which a Sterling engineer can make the proper choice. A letter from you is all that is necessary . . . may we serve you?

## For Better, Faster Grinding— Strong Bond "Pests" Between Each Grain



This magnified view shows how Sterling's low viscosity bonds flow into and build up strong "pests" between the abrasive grains. Result — better grinding . . . faster grinding.



• **STERLING ABRASIVES** •

**STERLING GRINDING WHEEL DIVISION**

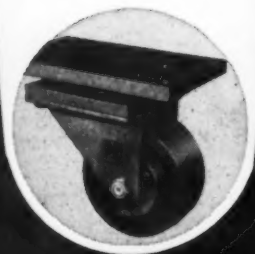
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THE WHEELS OF INDUSTRY



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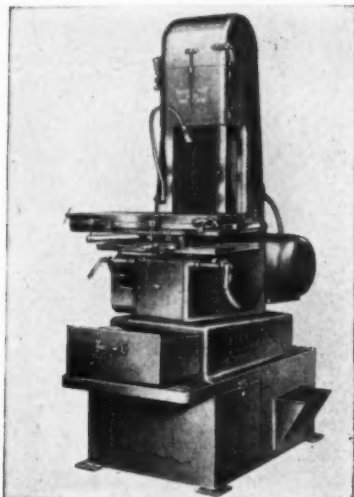
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60 WALKER ST., NEW YORK 13, N. Y.

36 N. CLINTON, CHICAGO 6, ILL.

bulletin emphasizes the fact that this Wet Belt Surfer is a heavier unit which gives rigid support to the table and close tolerances are easily held as a result.



Working surface on the standard plain table shown is  $17\frac{1}{2} \times 11\frac{1}{4}$ "—the area available on the 8x9" plate is  $7\frac{3}{4} \times 9$ "; 12" plate  $11\frac{3}{4} \times 9$ "; 16" plate  $15\frac{3}{4} \times 9$ "; using the automatic feed table, 8" plate  $7\frac{1}{2} \times 9$ "; 12",  $11\frac{1}{2} \times 9$ "; 16",  $15-1\frac{1}{2} \times 9$ ".

Longer work may be moved past the abrasive belt and platen, either free hand or on a suitable jig.

Abrasive belt 9" wide by 107" circumference is used. Plastic bonded belts are available in grits Nos. 24 to 600.

The coolant and grindings, or chips, fall into a large drawer, chips are trapped, and easily cleaned out. Coolant capacity is 35 gallons.

The Automatic Feed Table makes the model BG-8 a high speed production machine tool, capable of cutting operating time considerably. Operator is free to prepare for the next cycle as stock is being machined. Hydraulic control and mechanical settings control speed, pressure, finish and size.

## TYPE K THERMOSTAT

Bulletin No. 441T, describing Type K Thermostat manufactured by the United Electric Controls Co., 69 A St., Boston, 27, Mass. has been recently issued. The fold-



# BOYAR-SCHULTZ PROFILE GRINDERS



Vital Tools for Making the Tools  
of Production . . . . .



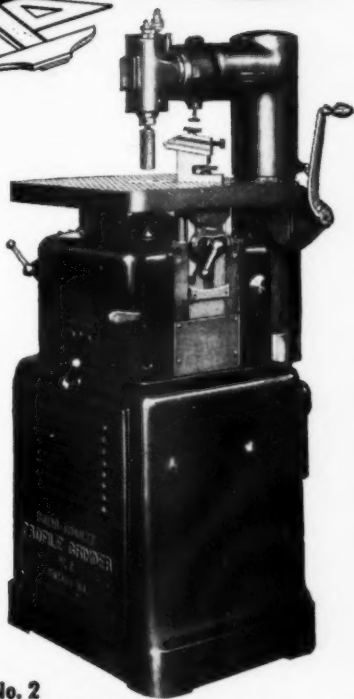
**W**ITH the coming change from "all out" production for war, to production for fast growing peace-time needs, machines for making the tools of production are more and more important.

Boyar-Schultz Profile Grinders have long been recognized as "vital" tools in the tool and die shop. They are built for economically grinding and finishing irregularly curved surfaces and odd contours so frequently encountered in making dies, punches, templates, cams and special machinery.



## No. 1

**Profile Grinder**, a bench size Profile Grinder operating at 20,000 R.P.M. For grinding and regrounding die clearances, sharpening punches, and economically grinding cams and templates.



## No. 2

**Profile Grinder**, with two independently powered spindles operating at 10,000 R.P.M. with vertical oscillations. Stock is removed rapidly, even with wheels of small diameter.

**BOYAR-SCHULTZ CORPORATION**  
2108 WALNUT STREET CHICAGO 12, ILLINOIS

er contains a number of illustrations of standard and special applications, together with charts, tables, and an in-

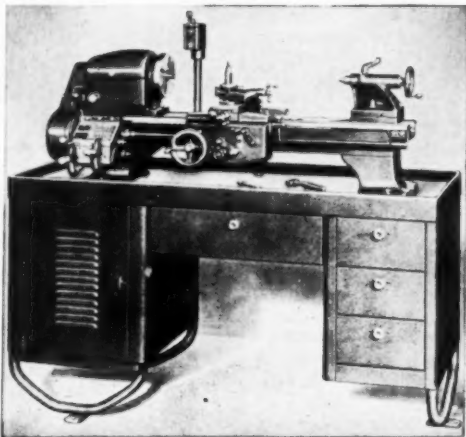
formative discussion on the desirable points and qualities of the Type K Thermostat.

## LOGAN QUICK CHANGE GEAR CABINET LATHE

Combining all features of the standard Logan Quick Change Gear Lathe in a compact cabinet, the new Logan No. 825 Lathe is adaptable to tool room work, for maintenance, training, or production. The entire unit is ruggedly built to stand continuous use.

The carriage with friction feed automatic apron travels over a bed that is claimed to be ground to within .0005" of absolute accuracy. Total run-out of its headstock spindle 12" from the bearings is said to be less than .001". Lead screw is held to within .002" in 12".

Spindle turns on a double row of preloaded precision ball bearings, and at 40 other vital points, friction is minimized by self lubricating bronze bearings. All moving parts and



## USE

### *Fluid-Motion for Modern form-dressing*

#### ONE SETTING HANDLE CONTINUOUS MOTION

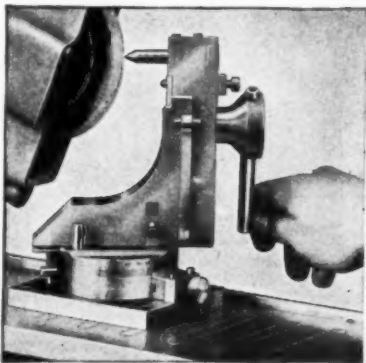
The J & S Model "E" Radii and Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.

#### FEATURES

Fluid-motion dressing  
.0001" accuracy  
Automatic centering  
14" wheel capacity  
Large range yet compact  
Chatterless and dustproof

#### J. & S. TOOL CO.

477 MAIN ST. E. ORANGE 2, N. J.



# 1 machine

for the work of

# SEVERAL

The Bodine basic principle of a horizontal automatic indexing dial, which carries the work to 6 or 8 spindles for separate and distinct operation on each piece during one cycle of the dial, is modern production at its best. One operator . . . small floor area . . . non-stop production . . . all mean saving of man hours, electrical power, electrical control equipment and factory space. There's also a definite cut in the handling of the product when one machine does the work of several.

*Simultaneously*

★ ★ ★

For example: one of the almost limitless set-ups of a Bodine machine produces 7 pieces per minute and performs 7 different operations on each piece . . . a saving of 75% in manpower and conserving about 50% in floor area, over previous methods. A new operator can be trained to run this machine in a matter of days . . . and quickly attain high and continuous production.

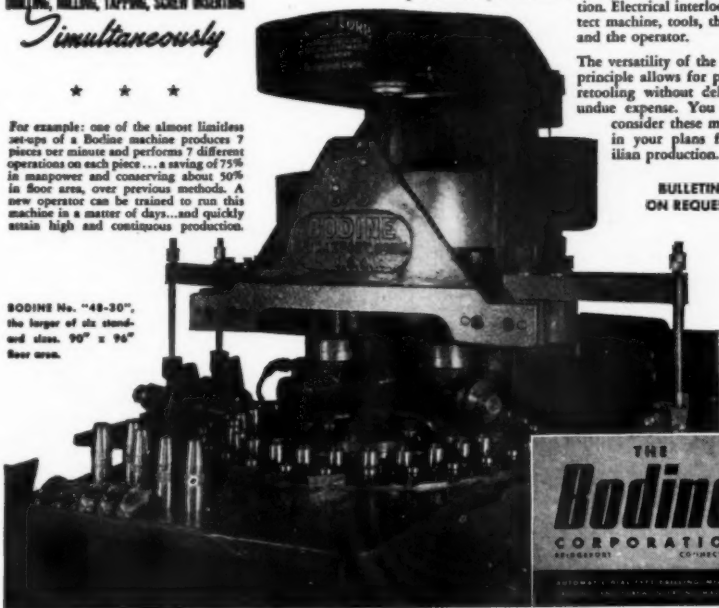
BODINE No. "48-30",  
the larger of the stand-  
ard sizes. 90" x 96"  
floor area.

**OPERATION:** The operator places the work in fixtures on the horizontal dial as it automatically indexes. 6 to 8 spindles located for milling, drilling, tapping, (and in some cases screw inserting) can operate vertically, horizontally, diagonally or from inverted positions, which provides endless possibilities for multiple spindle production. Tapping and drilling up to  $\frac{1}{8}$ " dia. and  $2\frac{1}{4}$ " in depth. Either manual or automatic ejection, depending upon the nature of the part. Automatic feed is also possible.

Bodine operation is clean, simple work which can be performed by older men and by women, without exertion. Electrical interlocks protect machine, tools, the work and the operator.

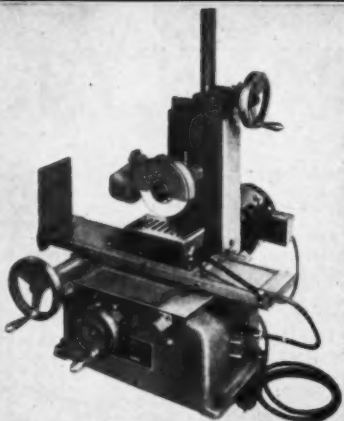
The versatility of the Bodine principle allows for post-war retooling without delay and undue expense. You should consider these machines in your plans for civilian production.

BULLETIN  
ON REQUEST



THE  
**Bodine**  
CORPORATION  
BROOKLYN, N.Y. CO-INDUSTRIAL

# SANFORD



## High-Speed BENCH SURFACE GRINDER

ACCURATE WITHIN .0001

A sensitive machine built to rigid standards of accuracy and workmanship specially designed "For the job that fits in your palm."

WRITE FOR BULLETIN

Available On M. R. O. Certifications

**SANFORD MFG. CO.**

1279-81 Springfield Ave.

Irvington 11, N. J.

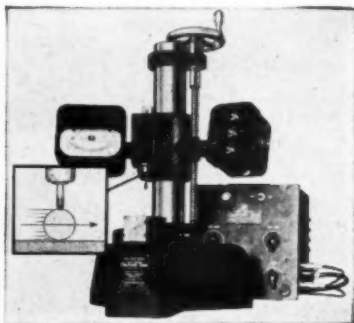
gears are completely enclosed. Power plant and underneath drive are enclosed in the left compartment of the four-drawer, stipple finish gray steel cabinet.

A Multiple V-belt Drive transmits power from cone pulley to spindle. Adjustments of both flat and V-belt tensions are easily accessible to operator. Three-point base assures a steady installation on any floor. Full information and complete specifications may be obtained from Logan Engineering Co., 4901 W. Lawrence Ave., Chicago 30, Ill.

### FEDERAL ELECTRONIC GAGE

The Federal Model 130 Foote-Pierson Gage is intended to inspect dimensions having very small tolerance limits at low cost with inexperienced operators.

Gaging is performed electronically and is not accomplished thru use of low frequency magnetic fields nor does it depend on the position of make-and-break electrical contacts. Variations in position of mechanical contact point are magnified sensitively, accurately and conveniently by means of the electronic circuit.



Despite its high degree of accuracy and repetitive quality, it is neither delicate nor easily abused.

Model 130 Gage is provided with both indicator dial and limit lights.

Indicator dial may be used to determine how much dimension varies from specified tolerance and for selecting workpieces according to their dimensional variations. Indicator dial is also used when setting Gage.

The limit lights provide an extremely rapid means of inspection. Any of three lights tells instantly the status of the dimension:—green is OK; red is oversize and yellow is undersize. The light flashes



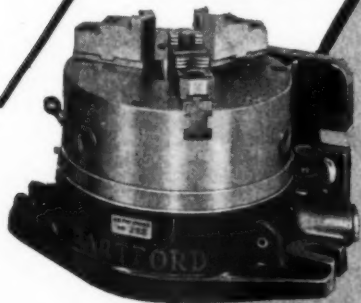
*The* **HARTFORD**

# *Super Spacer*

THE ULTIMATE IN CONTROL  
OF MACHINE OPERATION

*with . . .*

**its attachments  
and fixtures**



A tool of exceptional value for the rigid control of accurate indexing operations. It is quickly adaptable for milling, drilling, grinding, jig boring, and slotting at feeds and speeds limited only by the capacity of the holding means and the power of the machine.

**DESCRIPTIVE CIRCULAR  
SENT ON REQUEST**

**THE HARTFORD** Special Machinery Co.  
HARTFORD 5, CONN.

GIRLS CAN OPERATE

## NEW Rouse HAND MILLER FOR SMALL PARTS

**\$98**

(Without Fixtures)  
F. O. B. Chicago  
Motor Extra



One of the ROUSE Fixture Set-Ups that  
Speed Production

The Rouse Hand Miller is a versatile, efficient, high-speed ball bearing machine for handling light cuts in brass, aluminum and steel.

Rouse Fixture Set-Ups make the Rouse Hand Miller readily adaptable for accurately milling small parts for planes, radios, electric motors, and similar equipment. Spindle will take milling cutters or end mills.

Prompt delivery can be made.  
Send for circular.

**H. B. ROUSE & COMPANY**

2214 N. Wayne Ave., Chicago 14, Illinois

instantly much more quickly than the dial hand could be read. There is no necessity to maneuver workpiece under the contact point, back and forth, while observing maximum reading of dial hand. Neither is a backstop required. Just pass work thru—one pass only—and watch the lights. It is accurate, positive, and fast.

Only one mechanical means for setting to within plus or minus .003" is required as the wide range electrical zero adjustment covers the full scale of plus or minus .003". This permits a final zero setting even on the most sensitive scale.

One master only is required and this master need not be to the exact dimensions specified. As long as gage block or master is within range of indicator scale being used, Gage can be set exactly to the specified workpiece dimension.

Gage is set by means of simple radio type knobs while operator observes the indicator dial. Approximate location of the sensitive contact point is obtained manually by means of the lead screw which lowers or raises gaging head. Gaging head can also be swung 180° in either direction by rotating column.

Indicator dial is provided with two scales. Lower scale is graduated 3-0-3 and upper scale, 1-0-1. Depending upon magnification selected, the smallest division of each scale is equal to either .0001" or .00001". Any of four magnifications may be selected as desired by means of a four position selector switch. The contact pressure can be adjusted to suit requirements from 1½ to 16 ounces. Thus soft materials can be gaged without marring or distortion.

The control circuit automatically stabilizes instrument so that voltage fluctuations of plus or minus 10 Volts in power supply affect the accuracy by less than 1%.

Pilot light and circuit protective devices make the instrument practically foolproof. An easily accessible adjustment provides for long-time seasoning changes in circuit components. Mechanically the Gage is rigidly built; electrically all precision settings are amply protected against damage by suitably stabilized circuits.

Address Federal Products Corp., Providence, R. I., for additional details.

### NOBUR TOOL IMPROVED

An improvement that facilitates rapid use of the Nobur Tool has recently been announced by Nobur Mfg. Co., 912 N. Orange St., Los Angeles, Cal.

An engraved black line around circumference of the shaft increases the efficiency, ease and speed with which each

# *Avey Automatic*

## METHOD No. 9

### THE *Avey* CAM FEED UNIT

No. 1 Size—1/2" capacity in cast iron.

No. 2 Size—7/8" capacity in cast iron.



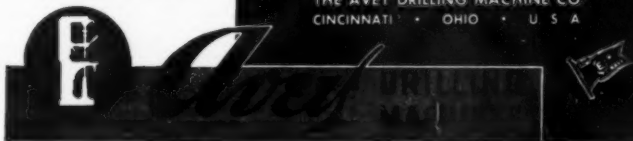
### CENTER COLUMN TYPE MACHINE

designed for multiple operation on two faces of work, where work includes too many holes or operations to be performed by center rotating table methods: (drilling—reaming—tapping).

METHOD No. 9 — Multiple tooling with tools accessible. Machines usually furnished in pairs, or with double fixtures at each indexing position, so that top and one side of work can be presented at one time, while bottom and opposite side can be presented in second position or on second machine.

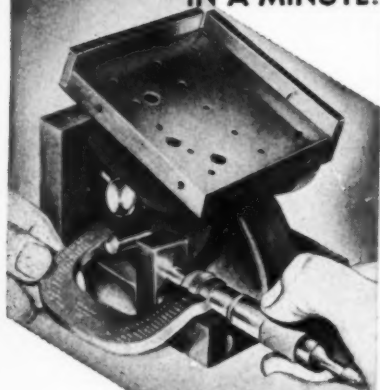
THE AVEY DRILLING MACHINE CO.  
CINCINNATI • OHIO • U S A

Write for  
operation sheet  
M-9  
for details.



# ANGLES

## TO A MINUTE... IN A MINUTE!



### THE BEMISINE

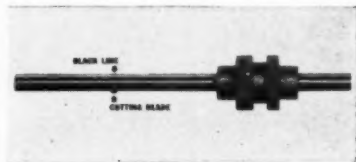
SPEEDS UP AND SIMPLIFIES SET-  
TING ANY ANGLE FROM 0 TO 90°  
—USING ONLY A 2" MICROM-  
ETER!\* IT HOLDS THE WORK!  
FASTER THAN A SINE BAR OR  
PROTRACTOR! CONVERTS SET-UP  
TIME TO PRODUCTION TIME ON  
SURFACE GRINDERS, JIG BORERS  
AND MILLERS.

\*Also Used With  
Standard Gage Blocks

**NICHOLS-MORRIS CORPORATION**

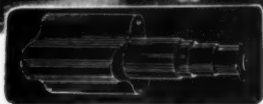
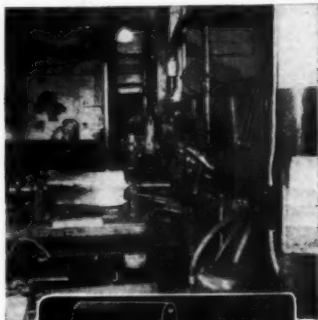
424 CHURCH STREET, NEW YORK 7, N.Y.

tool can be used. Placed around shaft at a point indicating center of the cutting blade, this black line provides a good clear marking for position of work piece when burring. All new Tools will carry this marking.

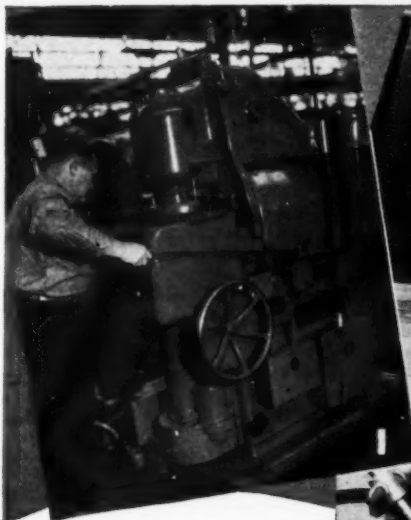


The Tool is a burr-removing tool that removes all burrs and sharp edges around inside of holes, of either single or multi-walled parts. It can be placed in the spindle of any machine tool and operated safely by any worker. Its sharp cutting blade quickly removes burrs. Parts can be deburred as fast as they can be handled.

### PLANING CURVED SURFACES



A speedier method of planing curved surfaces, such as the gear-like impellers for water-pumps, gas exhausters and blowers, has recently been devised by the Turchan Follower Machine Co., 8253 Livernois, Detroit 4, Mich. By means of a Turchan Follower Attachment, the three gear-like surfaces are said to be completely finished to a tolerance of .001" in one-seventh the time formerly required by hand methods.



- 1.** Walker Single Stroke Surface Grinder  
Quality — Precision  
— Production.



- 2.** A "Walker" Chuck as used on  
a well known Surface Grinder.

- 3.** Front view of a "Walker"  
Grinder. Up-to-date Tool Engineers  
and Production Men refer  
their production problems to

**O. S. WALKER CO., INC.**

WOBBURN ST.

• WORCESTER, MASS.

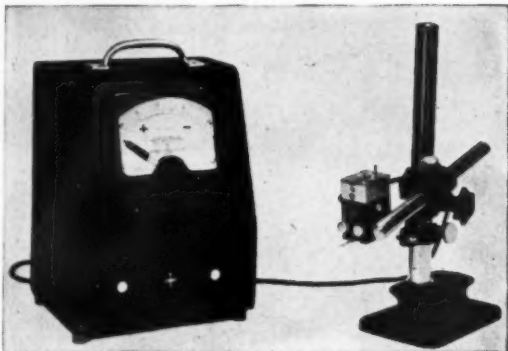
## ELECTROLIMIT HEIGHT GAGE

Pratt & Whitney, West Hartford, Conn., have announced a new feature which has been added to their Electrolimit Height Gage.

The original head, widely used for several years, measured in one direction only. The new head carries a small lever which permits setting the gage for measuring either up or down, an advantage in many tool-room setups.

The gage may be furnished complete with indicator and either of two stands, or the head alone may be purchased separately. This permits owners of the previous model to substitute the new head without replacing the stand or indicator.

The new Reversing Height Gage oper-



ates on the same basic principle as all P & W Electrolimit Gages. The translation of a mechanical movement into electrical magnification produces very sensitive results on precision work. Mechanical parts are made by Pratt & Whitney, and all



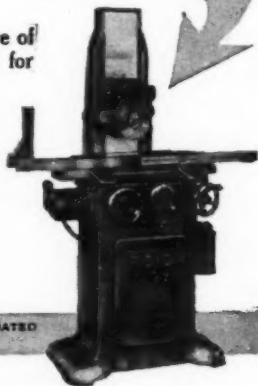
**"REID for a FINER finish!"**

REID SURFACE GRINDERS are of heavy, rigid stress-proof construction for smoother work finish.

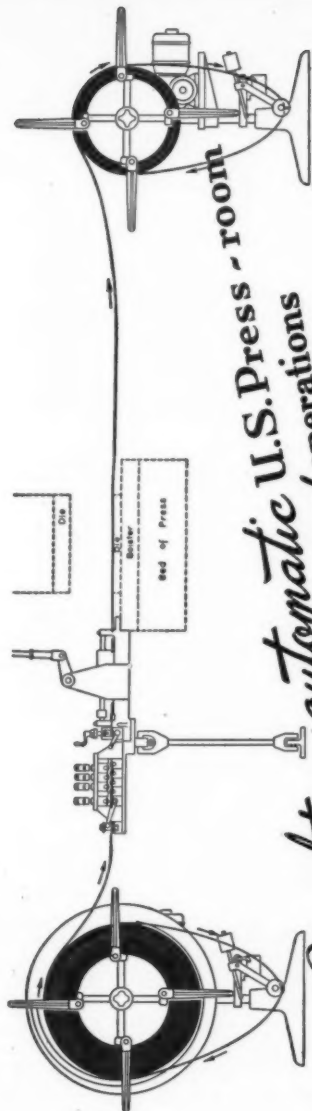
**ACCURACY** ✓  
**SIMPLICITY** ✓  
**DURABILITY** ✓  
**CONSISTENCY** ✓  
**ECONOMY** ✓

Centralized controls assure ease of operation . . . simple, well balanced design for longer care-free duty.

Whether for precision-production work or tool room precision work **REID GRINDERS** are built to do the job **RIGHT!** Send for catalog and price list today.



**REID BROTHERS COMPANY, INCORPORATED**  
**BEVERLY, MASSACHUSETTS**



## Complete... automatic U.S. Press - room Equipment for improved operations

The above drawing illustrates the ideal setup for metal stamping. It consists of the U. S. Automatic Stock Reels applied in conjunction with U. S. Slide Feed, Roller Check and Stock Straightener. This combination assures high speed, top efficiency and the greatest possible economy. The unit at the left of the drawing illustrates the patented design for the latest U. S. Stock Reel, which features a specially grooved disc for easily and accurately centralizing the stock unit to the right in the drawing is a combination

The next unit to the right in the drawing is a combination of the No. SF-2 Slide Feed, Roller Check and Stock Straightener, the perfect setup for accurately feeding coil stock into punch press dies without the need of pilots. Slide Feeds are available in a range of sizes to accommodate various widths of stock and feed lengths. The feed-accuracy obtained surpasses by far the accuracy of roll feeds, hitch feeds or hand feeding. The Roller Check

(mounted between the Feed and Straightener) consists of a pair of rolls controlled by a one-way clutch, permitting free forward rotation only and positively preventing backward slippage, regardless of tension. The Stock Straightener is fully dependable, with the advantage of anti-friction bearings, crank-operated entering rolls (to start a new coil without disengagement), provision for adjusting each individual roll for the desired straightening action, and assurance of parallelism between all rolls. Indicated at the extreme right is another U. S. Automatic Stock Reel for rewinding scrap; this is essentially the same as the Reel at the left, except that the Centralizing feature is omitted.

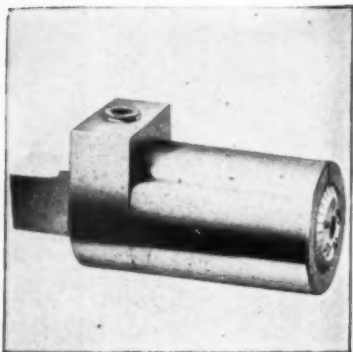
Detailed features of each of these U. S. units are fully illustrated and described in Bulletin No. 50H with complete specifications for these units (also Coil Cradles and Stock Oilers). Write for your copy.

# U. S. TOOL COMPANY, INC., AMPERE (East Orange), N. J.

BUILDERS OF U. S. MULTISLIDES, U. S. MULTIMILLERS, U. S. AUTOMATIC PRESS ROOM EQUIPMENT,  
U. S. DIE SETS AND ACCESSORIES

coils and electrical parts are made by General Electric.

### BORING BAR INSERT



Nash-Zempel Tool Division of J. M. Nash Co., 2354 N. 30th St., Milwaukee,

Wis., announces a micrometer-adjustable Boring Bar Insert in which short pieces of scrap tool bits may be used as replacement cutters.

Only one simple procedure is necessary to make a replacement cutter for this boring-bar insert. It is merely a matter of squaring up the cutter stock to fit the square hole in the insert. This can be accomplished in a minimum amount of time on any surface grinder, and as the dovetail for the cutter is only a shallow cut, this operation does not require special tools.

Insert can be installed on any bar available by a simple boring operation. Locating head of the boring bar insert fits snugly into the recessed slot of bar itself and always assumes the same location. Set screw in the boring bar locates insert and draws the head firmly against shoulder of the recessed slot in the bar. Accurate location point is thus always maintained.

The micrometer dial of the insert has 25 graduations, each registering .001". Adjustment is accurate and reliable. Loosen-

## Does Your NEW Product Need CLUTCHES?

If your new or improved products will benefit from better clutches, we can give you timely help:

As clutch building specialists, with over a quarter century of experience, we study your product designs and recommend the BEST clutches for your particular needs. We then have the facilities to produce those clutches on a basis that will strengthen the competitive position of your products — as to power, control, size, weight, service and price. **BRING YOUR CLUTCH PROBLEMS TO US** — By

sending your specifications to us NOW, your clutch needs can be met without unnecessary delay — when reconversion starts.



### SEND FOR THIS HANDY BULLETIN ON POWER TRANSMISSION

It shows typical installations of **ROCKFORD CLUTCHES** and **POWER TAKE-OFFS**. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning postwar products.



## PULLMORE CLUTCHES

**Rockford Drilling Machine Division**  
Borg-Warner Corporation  
1309 Eighteenth Avenue, Rockford, Ill.





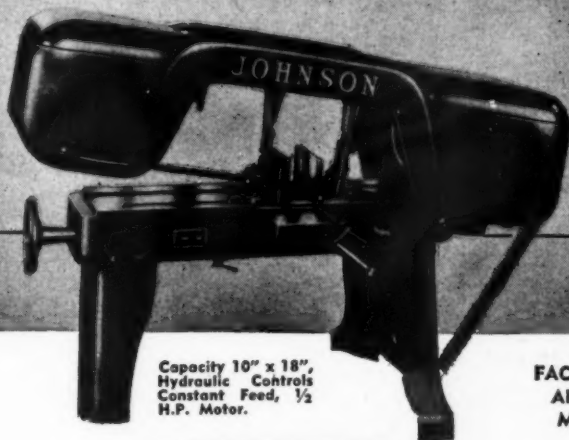
# SPEED PLUS EFFICIENCY

## Triple Saving Saw

↓ SAVES TIME

↓ SAVES LABOR

↓ SAVES MATERIAL



Capacity 10" x 18",  
Hydraulic Controls  
Constant Feed, 1/2  
H.P. Motor.

FACTORY:  
Albion,  
Mich.

## JOHNSON METAL CUT-OFF BANDSAW

This versatile saw in your plant will help speed production at a real saving in labor, time and material. Suited for every kind of cutting

job, it is simple to operate; offers a wide range in cutting speeds. Three-point base affords secure anchorage on any type of flooring.

# J

*Write for Descriptive Folder to Sales Offices:*

**JOHNSON MANUFACTURING CORP.**

5000 CHRYSLER BLDG., NEW YORK 17, N. Y.

ing of one set screw permits removal of insert from bar.

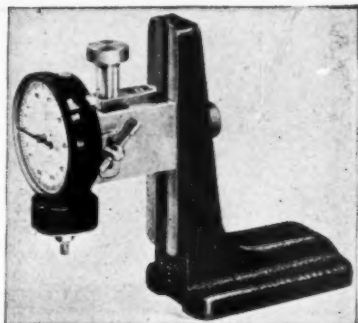
The Boring Bar Insert is made in 40 standard sizes, and maker will furnish inserts for any standard or special bars. If desired, standard or special boring bars will be furnished with Boring Bar Inserts.

#### PEDESTAL INDICATORS

Addition of a non-ferrous model Pedestal Indicator, designed especially for free use in an active magnetic field, has been made by the Bartelt Engineering Co., 1412 Partridge Ave., Beloit, Wis.

All parts of this model "DNF-10", except the dial indicator, are constructed of hard brass. This makes it suitable for such service as setting up and checking work being held on a magnetic chuck, an operation that is difficult with an ordinary height gage or other measuring device because of the strong pull of the magnetic field.

This model and its steel counterpart, Model "DF-10" are designed for gaging from flat surfaces such as machine tables, surface plates, bed or upright ways, etc. For approximate setting, the carriage block is clamped where desired on the upright. The dial indicator is then adjusted to exact position on face of the



carriage block with a micrometer screw and clamped separately. This permits added fineness of vernier adjustment and the carriage block gives increased clearance from face of pedestal upright.

The dial has a first division reading of .0001". Overall height is 8" with a range of approximately 4" from the base surface upward. Pedestal itself is a high quality fine grain casting with the base and vertical surfaces ground to extremely

## FOR MEASURING FLATNESS

in "tenths" or "millionths"

ALL YOU NEED IS AN  
**Acme Monochromatic Lamp  
and an Acme Optical Flat**

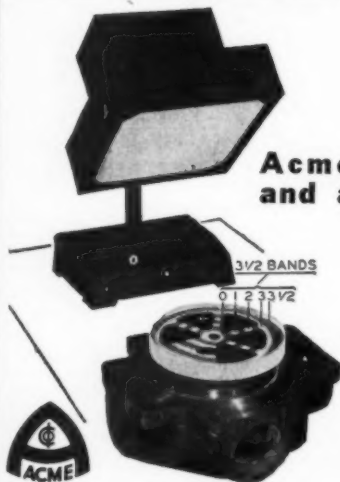
Valve illustrated at left, will not leak under pressure because inspection shows it to be FLAT within  $3\frac{1}{2}$  bands (40 millionths).

The bands appear when you simply lay the optical flat on a highly finished work surface and view by the light of the Acme Monochromatic Lamp. No skill is needed — Any one can do it.

Send sample and state flatness tolerance. We'll immediately quote suitable lamp and optical flat.

**ACME SCIENTIFIC**  
DIVISION OF ACME INDUSTRIAL COMPANY  
Makers of Standardized Jig and Fixture Bushings  
212 N. LAFLIN STREET, CHICAGO 7, ILL.  
MONroe 4122

Send for free booklet,  
Shop Measurements with Light Waves



## You Can Get The Work Out With These Versatile, Wade Standard

### PRECISION HAND SCREW MACHINE UNITS



# Wade

**Bench Lathes and Profilers  
For Precision, Versatility  
And Stamina**

Wade Standard Precision Hand Screw Machine Units get the work out . . . they're built for precision production operations. • Headstock has double row roller bearing. • Lever Closer runs on ball bearing; operates positively to open or close collet with instant movement. • Double Cross Slide movement  $2\frac{3}{4}$ "; provided with adjustable stops. • Automatic Turret Attachment; Tilted self-clamping 6-station head; takes  $\frac{3}{4}$ " shank tools; Adjustable stops index automatically. • Turret working travel  $3\frac{1}{4}$ "; indexing travel 1"; total  $4\frac{1}{4}$ ". • Unit has 32" bed. • Collet cap: Model #5,  $\frac{3}{4}$ "; #7, 1". • Weight, net: #5, 172 lbs., #7, 184 lbs., with laminated maple top steel bench, approx. 660 lbs.

*Write today for catalog*

## THE WADE TOOL COMPANY

WALTHAM 54, MASSACHUSETTS

# "10 MILLION PIECES

without a single rejection,  
thanks to MICRO-CHEK"

- says LUCAS SCREW  
PRODUCTS, Inc.



Priced from  
**\$9.75**

Users of nearly 100  
Trico MICRO-  
CHEKS, Lucas  
Screw Products,  
Inc., of Rochester, N. Y., reports:

"We find them to be a low-cost economical way of controlling accuracy on high precision automatic screw machine production. In numerous cases, we have reduced our gage cost from 50 to 75 per cent. They check close tolerances... eliminating fatigue and uncertainty upon the operator. Their simplicity enables us to use inexperienced help in final inspection. In one case we produced 10,000,000 pieces without a single rejection from the prime contractor."

Speed inspections in YOUR plant with TRICO MICRO-CHEK Comparator Gages, now in use in more than 3600 war plants... on machines, on inspection lines. Send for booklet which illustrates many applications.

**TRICO** MICRO-CHEK  
TRICO PRODUCTS CORP.  
50 Trico Square, Buffalo 3, N. Y.

close limits. All surfaces of gage except those which are ground or polished, are finished in black crackle.

## THE HAND-E-ROLLER

A clever piece of handling equipment is offered by Passman Bros. Inc., 1101 W. Lake St., Chicago, Ill. Known as the Hand-E-Roller, it takes the hard work out of lifting and transporting tote boxes.

In use the device is backed up to the box or boxes. The handle is raised and the hook attached to the box handle. Holding the device stationary with one foot the handle is pulled forward, sliding the tote boxes up on the top rollers. The load is then ready for easy transporting.



The device is of rugged design, the chassis is a welded steel frame equipped with two sets of ball bearing rollers. The upper rollers are used for placing tote box on the truck and the lower ones for moving the truck. The hook is adjustable for various types of boxes and is equipped with a stop to hold it in place.


Two models are available; 11½ and 13¾" width chasses. Either will carry a maximum load of 600 lbs. An attractive bulletin gives full details.

## CLEVELAND CRANE GRAPHIC

Now available is Vol. 3, an 8-page publication issued by the Cleveland Crane & Engr. Co., 1129 E. 283rd St., Wickliffe, Ohio. Colorfully illustrated, this bulletin shows and describes various operations done in the Company plants and considerable space is devoted to a discussion of 30 cranes for Brazil's new steel mill. Also pictured and described are the many uses of Cleveland equipment in numerous plants throughout this country.

WHY *You* SHOULD BE USING

## BOKUM BORING TOOLS



**HELICAL RELIEF**  
maintains constant  
clearance angle

**RESHARPENING**  
is confined to one face

**FINISH LAPPED**  
cutting surfaces produce better  
bores with faster feeds

The cutting edge forms an angle which will always cut free because of the special helical backed-off form of the front end of the tool.

Resharpener never destroys the original free-cutting action of the tool.

Style A Tools (shown above) are for boring through holes—made in sizes small enough to bore  $\frac{1}{8}$ " holes, to sizes husky enough to bore extremely large holes.

Style B Tools are for boring and bottoming blind holes from  $\frac{3}{16}$ " dia. up.

Style C Tools are for internal threading from  $\frac{7}{32}$ " dia. up.

**BUY WAR BONDS**

Ask for Catalog H-1139 for Super High Speed Tools  
and for H-398 for Carbide Tipped



**BOKUM TOOL CO.**

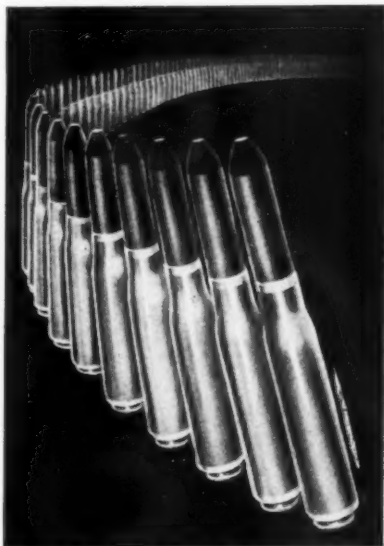
14775 WILDEMERE AVE. • DETROIT 21, MICH.



## How a Manufacturer DOUBLED Tap Life and MULTIPLIED PRODUCTION with a Bowser Thread Cutting Oil System

From metal vaults and cemetery equipment to 20 mm shells . . . that's the production switch The Champion Company, Springfield, Ohio, made when Uncle Sam needed help. That's a broad jump . . . but Champion made it in stride, with the aid of modern tooling and Bowser Liquid Control.

Tapping is, of course, a major operation in making shells, and high output from the tappers is vital. But steel particles in the cutting oil of Champion's tappers were dulling taps too quickly, causing excessive rejects due to poor threads, and continually causing down time on the machines. Then a Bowser Pressure Filter was installed and, in the words of a Champion executive, "We cut our tap requirements in half, got a better thread and had practically no down time on our machines."



Somewhere in your own plant there is a liquid control problem that some type of Bowser equipment will handle better—probably with as outstanding results in the saving of time, equipment and money as The Champion Company is enjoying. Bowser Meters, Filters, Proportioners, Lubricating Systems, Pumps, etc., are daily proving their indispensability in every phase of industry. Write for details. BOWSER, INC., Dept. 15-B, Fort Wayne 2, Ind.



Not only has Bowser's war production earned the Army-Navy E . . . Bowser equipment has helped earn it for scores of other companies.



The Name That Means  
**EXACT CONTROL**  
of Liquids

**Consult**

**SYNCRO**

**the HOME of  
Precision and Production**

SYNCRO specializes in the manufacture of precision machined products and in the solution of unusual engineering and production problems. The skill and experience of SYNCRO craftsmen is at your service — now and after Victory.

**SYNCRO DEVICES, INC.**

**Ferndale 20, Michigan**



## BENCH OPTICAL COMPARATOR

A 14" Universal Bench Optical Comparator and Measuring Machine is announced by Jones & Lamson Machine Co., Springfield, Vt.

This Comparator has a table 16" long, that allows measurements of lead and spacing up to 2" to be made. A hand-wheel graduated in .0001" operates on a hardened and ground thread spindle for making vertical measurements up to 1 3/4". A ball thrust bearing with hardened plates is incorporated in the handwheel



to eliminate friction and to assure ease of operation.

On one end of table is a vernier segment with provision for compounding the table 15 degrees either side of center, for projecting hobs, worms and threads normal to their helix angle. An Angle Measuring Attachment is provided for measuring angles in degrees and minutes.

Maximum height of lens above table is 3" and centers are available for staging objects up to 3" in diameter by 11" in length. Other fixtures which may be used with this machine are:—Vise Stage, Right Angle Stage, 1" V-Block and Reflection Attachment.

Lenses available for this machine are:—82mm lens system to project a 1.4" area at 10 magnifications; 46mm lens system to project a .7" area at 20 magnifications; 48mm objective—with 10X Ocular to pro-



A Bay State Hand Tapper saves 75% of direct hand tapping costs. Quick, accurate tapping — minimum spoilage — instantly ready — no set-up needed. Includes proper spindle tap for every job.

Bay State Handy Vise — accurate, light weight, for tapping, drilling, grinding or jig boring.

Write for circular. Distributor inquiries invited.

**BAY STATE TOOL & MACHINE CO.**

DEPT. B 412 ALBANY STREET, SPRINGFIELD, MASS.

**CLOSED**

**CLOSED**

OPEN

**TRADE**  **MARK**

OPEN

**Plain Type**

**Offset Type**

**CONTINUOUS HINGES**

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

**THREE-FOURTHS OFFSET.**

**AUTO MOULDING & MFG. CO.**

**2326 S. CANAL ST**

**CHICAGO**

**SPECIFICATIONS:**

Open Width 1/2" to 6"

Gage Material .040 to .125

Pin Diameter .101 to 3/8"

Lengths to 120"

**SEMI-OFFSET**





SAID THE FIELD  
TEST REPORT

# "AN OUTSTANDING Performance"



• Time after time this phrase is used by our field engineers reporting on tests of Mid-West Abrasive Company products in competition with other abrasives.

A typical report reads:

"Our 2.80 JY-11 wheel gave an outstanding performance on a test involving grinding intake and exhaust valves on airplane engines. It produced excellent finish, with rapid stock removal, minimum temperature rise, and almost **THREE TIMES THE NUMBER** of valves produced by competitive wheel."

Let one of our staff of highly-trained field engineers make a study of your abrasive problem. You'll find there's a Mid-West item to fill every need. Prompt delivery on grinding wheels, honing stones, sandpaper, rubbing bricks, sharpening stones, or any product in the Mid-West line.



## MID-WEST ABRASIVE CO.

Manufacturers of *DEPENDABLE* Abrasives

Owassa  
Mich.

1960 E. Milwaukee  
Detroit 11, Mich.

Rochester  
Pa.

Mid-West Abrasive Co.  
1960 E. Milwaukee Ave., Detroit 11, Michigan

Please send me your complete data book on grinding wheels.

NAME \_\_\_\_\_

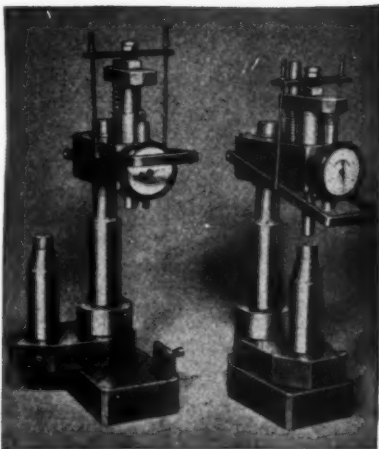
ADDRESS \_\_\_\_\_

ject a  $7/32''$  are at  $62\frac{1}{2}$  magnifications;—with 8X Ocular to project a  $9/32''$  area at 50 magnifications;—with 5X Ocular to project  $13/32''$  area at  $31\frac{1}{4}$  magnifications.

### SUN DIAL GAUGES

Sun dial indicator gauges afford an easy and dependable means of determining depth, length, thickness, height, location and special measurements. These high speed, durable gauges enable you to take readings of variations as small as  $.0001''$ . Each individual depth and length dimension may be checked visually, and errors determined. No expensive or complicated measuring equipment is required, either for checking or setting. A simple master setting gauge supplied with each Sun instrument provides a speedy and dependable method of setting and checking.

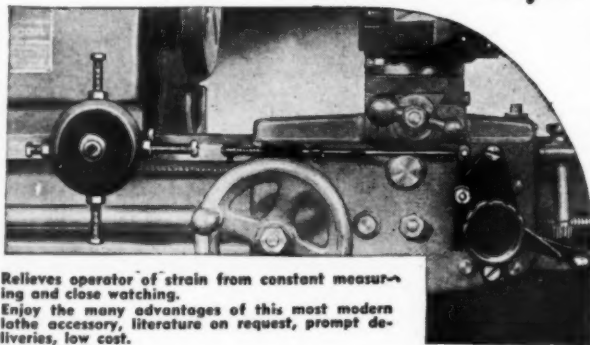
The illustration shows a set up for checking in ordnance work where many of these gauges are being used. An attractive new bulletin gives full details and is available from the Sun Tool and Gauge Corp., 380 Canal St., New York, N. Y.



**The New**



**Automatic Feed Control for  
Atlas and Logan Lathes**



Relieves operator of strain from constant measuring and close watching.

Enjoy the many advantages of this most modern lathe accessory, literature on request, prompt deliveries, low cost.

Operates the half-nuts mechanically.

Stops accidents to work or tools.

Often allows one operator to handle two or more lathes at a time.

Why not check your lathe operations NOW?

Dealers or

**INDEPENDENT SPECIALTIES, 152 W. 75th St., Chicago 21, Ill.**



# ADJUSTABLE HOLLOW MILLS



(Standard Style H)  
Facing & Counterboring  
Tool

**Cut Cost — Increase Production**  
with GENESEE inserted blade—  
**ADJUSTABLE HOLLOW MILLS**  
**FACING & COUNTERBORING TOOLS**  
**SPECIAL PRODUCTION TOOLS**

Backed by 35 years experience our Engineering Department is always ready to serve you in your Production Tool problems.

*Write for complete Catalog No. 42-7*

**GENESEE**  
**MANUFACTURING CO., Inc.**  
**ROCHESTER 4, N. Y.**



# KIPP

*Featherweight*

## AIR GRINDER

**\$29.75**  
in U.S.A.

Weight 12 Ounces; Length 6 3/4 in;  
Chuck Size 3/8 in. Wheel Guard  
Removed for Better Illustration

The Model JA is new in design both inside and outside. In it are utilized fewer parts, and they are made of Magnesium and Aluminum for extreme featherweight lightness. The alloy steel shaft diameter is unusually large for sustained smooth and true operation. This means still longer wheel life and better grinding. The speed, as before, is governed at 50,000 R.P.M. and there are selected ball bearings, front and rear. The JA Featherweight is a distinct improvement over all models previously produced by Madison-Kipp, the originators of really high speed grinders.

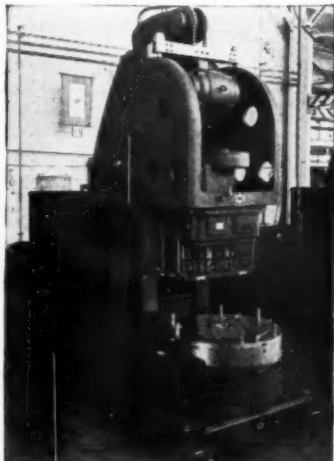
The same low price, \$29.75 in U.S.A., remains. It is a post-war design for which materials have been released early. The pre-announcement output was geared to expected demand. Deliveries will be made out of stock as long as possible.

**MADISON-KIPP CORPORATION**  
287 WAUBESA ST., MADISON 4, WIS., U.S.A.

### DEFIANCE DRILLING MACHINE

The new Defiance No. 540 vertical hydraulic feed machine, manufactured by Defiance Machine Works, Inc., Defiance, Ohio, is designed for heavy duty single or multiple spindle drilling, boring, reaming, or milling operations.

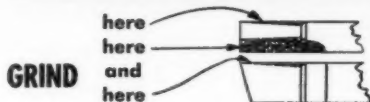
The column is a heavy-type cored casting with long ways which carry the head slide. Ways are oiled by a Bijur oiling system. Column supports the hydraulic feed cylinder which operates head; also encloses weights that counterbalance head and slide.



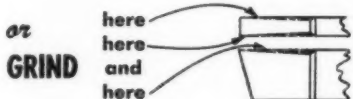
Machine is provided with an automatic cycle of rapid approach, feed, (adjustable) rapid return to stop. Cycle can be arranged with a dwell at end of feed if so desired. Head is driven thru multiple "V" belt and provided with one pair of pick off change gears to give a speed of from 200 to 500 rpm as selected, at power take off. Main drive bracket and head are automatically lubricated.

This machine has a 28-spindle head and fixture for drilling 11/16" holes in large diameter plates 3/4" and 3/8" thick. For this operation, machine has a 42" three station indexing table. Table has a ball thrust bearing on end of trunnion bearing and every time index pin is disengaged, table is lifted up slightly by a lifting device which allows table to be indexed very easily. Index pin and lifting

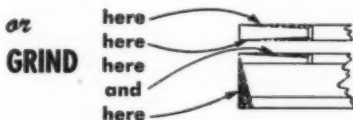
# WHY DO YOU *Still* DO IT?



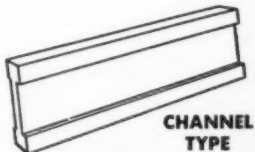
before you  
can use



before you  
can use



before you  
can use

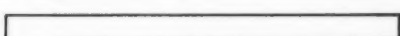


**When EMPIRE TOOL COMPANY'S** LUERS PATENTED  
**CUTTING-OFF BLADE** *comes to you ready to use*  
**with ALL clearances provided**

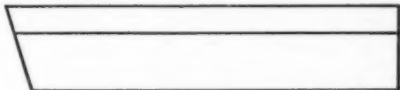
Tapered (T-Series) Blades provide back and side clearances full length.



Parallel (P-Series) Blades recommended where uniform width cut-off must be maintained, or for grooving or shallow cut-offs.



T-shape design provides constant side clearances. Hollow-ground top further reduces friction.



When you get a Luers blade it's ready to put on your machine. Its scientific design provides necessary clearances at more points than any other cut-off blade provides. Thus excessive friction is eliminated—tool life is prolonged, down time is reduced, and production is increased.

Cobalt Blades now available for machining at high speeds. Especially efficient on abrasive materials and tough jobs.

We have holders with proper rake built-in to fit any standard hand or automatic screw machines. Permit quick removal and replacement of blade after resharpening without disturbing set-up.

Also makers of Empire Floating Tool Holders, distributors of Fast Cut Centerdrills and Keyseat Cutters and Rigid Live Centers

EMPIRE TOOL COMPANY MANUFACTURES LUERS  
PATENTED CUTTING-OFF BLADES AND  
HOLDERS UNDER LICENSE ISSUED  
BY JOHN MILTON LUERS  
PATENTS, INC.

**EMPIRE Tool Co.**

8774 GRINNELL AVE.  
DETROIT 13, MICHIGAN

SEND FOR COMPLETE CATALOG

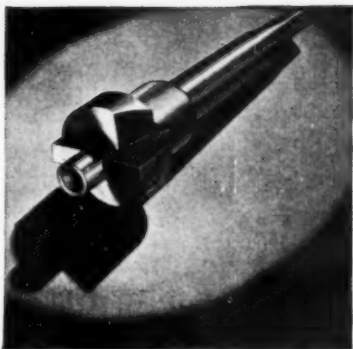
device are controlled by hydraulic cylinder. Machine is so arranged that table must be in proper position before machine can be started in its automatic cycle.

General specifications include motor:— 25 hp, 1800 rpm; distance of spindle to face of column, 26"; feed cylinder, 7½"; stroke of head, 20"; head guide length on column, 60"; overall width of ways on column, 28"; size of base, 60x118"; weight of machine, 39,150 lbs.

### RIEGER MULTIFACER

A new tool being introduced by The Rieger Mfg. Co. Dept. Mt-10, Miamisburg, Ohio, is the Multifacer. It is applicable to drill presses, engine and turret lathes, and milling machines for spot facing, boring, counterboring, valve seating, and cutting convex or concave annular rings.

Head of the Multifacer is slotted for insertion of a bit ground to desired contour. Bit is locked in place with three set-screws. Due to 3-point suspension, the bit can be adjusted to cut evenly altho the grinding may be somewhat faulty. Clearance slots provide for escape of shavings and chips.



Three standard sizes of the tool will make cuts of 1" to 5" diameters. Other sizes are available on special order. It is built of tough alloy steel, heat treated and ground. It is said to have the ruggedness to last indefinitely under hard usage.

**New STEEL**  
**INSPECTOR'S STAMPS**

Faster Identification of Inspectors or Operators. Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.

**NEW METHOD STEEL STAMPS, Inc.**  
141 103 CAMDEN DETROIT 7 U.S.A.

**RECONDITION YOUR OLD SAW BLADES**  
**HERE IS A NEW SAW SALVAGING MACHINE**

**THE HOWE-LINDSEY AUTOMATIC SAW SHARPENER**

**Save... Time . Money and Critical Materials**

**HOWE AND SON, INC.**  
**HINSDALE, N. H.**

# ***Sharp, Clear Impressions*** **ON ALL METAL MARKING JOBS!**



**ANY METAL PART** that requires a serial number, a catalog number, size identification—or any other type of marking—can be quickly and clearly marked with Mercury Steel Letters and Figures!

These Stamps are made of the finest carbon steel to protect against breakage and give you years of service on all part marking work. The letters or figures are deep cut with sharp faces for ease of stamping on even the hardest metals. Accurate bevel further assures clear impressions, and aids in alignment. The husky steel body is amply large to withstand severest use.

A large stock of Mercury Steel Letters and Figures in sets and sorts is available in sizes to meet a complete range of metal marking needs. Special sizes can be made to your specifications, if desired. Write Dept. B for complete details, and briefly outline your marking problem for our recommendation on the Mercury Stamps to meet your needs!



**Metal Marking Tool Specialists for Over 25 Years**

**MERCURY METAL DIE AND LETTER CO.**

536 EAST 16TH STREET, LOS ANGELES 15, CALIFORNIA

## THREAD-ALL Tapper



### PRECISION TAPPING !! LICKED !!

**By Converting Any Drill Press into  
a Precision Tapping Machine.**

Check these advantages:

Handles small taps without fear of breakage. Takes sizes up to 1½" with ease.

Gives precision tapping without need of lead screws.

Electro-magnetically controlled positive depth setting.

No adjustments required for tap sizes.

Silent forward and automatic high speed reverse action.

Taps right or left hand without adjustment.

Machine may be used for drilling, reaming, counterboring, etc. without adjustment.

Write for full details.

**GRUEN GAUGE CO.**

10039 Marcus Ave.

Detroit, Mich.

## COLLECTOR RINGS

The B. A. Wesche Electric Co., 1628 Vine St., Cincinnati, Ohio, manufacturer of the Welco Torque Motors now offers "Custom-built" collector rings. These collector rings are made to meet the special requirements of any application. The Company has greatly expanded its collector ring department, and is now able to supply the markets in even greater proportion than ever before.



Wesche is widely known as maker of "Custom-built" torque motors in all sizes up to 75 hp. They are known to the trade as Welco Uniframe Torque Motors and are used to power machines of every description, particularly modern machine tools. These motors definitely solved the problem that bedeviled electrical engineers for years. "How to build both A.C. and D.C. motors that can be interchanged to fit the same housings or frames". These motors eliminate the necessity of changing design, housings or frames when either a-c or d-c powering is required. To the machine builder whose designs conform to the present trend of "built-in" construction and remote control, this feature is particularly valuable.

The same outstanding exclusiveness of design and function are incorporated in Welco collector rings, according to L. J. Santen, General Manager.

## POSTPONE ASTE SHOW

Indefinite postponement of the Industrial Planning and Production Exposition sponsored by the American Society of Tool Engineers for March 1945 in Cleveland has been announced by D. D. Burn-



**FOR ACCURACY TO .0001"...**

# Speedichuk

WITH THE Precision  
**BREN COLLET**

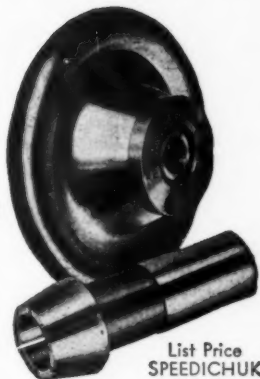
**Increases 1/2" Collet Capacity Lathes to 3/4"**

- Fits ATLAS, LOGAN, SOUTH BEND, CLAUSING Lathes and others with a 1 1/2" x 8 Thread Spindle Nose having a No. 3 Morse Taper on inside

Accuracy to .0001" is possible with SPEEDICHUK because of its unique floating closing ring and the BREN Collet, whose body taper conforms with the taper of the lathe spindle.

Centering to desired accuracy may be attained by tapping work, and indicating. SPEEDICHUK is ideal for tool room use or short production runs where speed in opening and closing on work is not essential. It requires no adapter plate and is easily fitted to the lathe.

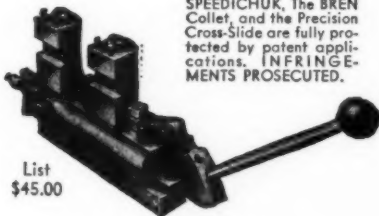
**...AND FOR PRODUCTION CUT-OFF WORK, FORMING, ETC.**



List Price  
**SPEEDICHUK**  
\$19.75  
**BREN Collets**  
Round \$4.50  
Sq. & Hex. \$7.50

**IMMEDIATE  
DELIVERY  
FROM STOCK**

## THE NEW Precision LEVER TYPE CROSS-SLIDE



List  
\$45.00

SPEEDICHUK, The BREN Collet, and the Precision Cross-Slide are fully protected by patent applications. INFRINGEMENTS PROSECUTED.

- Equipped with sensational tool leveling adjustment  
— Maintains tool in absolutely horizontal position.

A sturdily constructed job, this Cross-Slide has no rack and pinion to become clogged with chips. Handle adjustable in three positions for convenience of operator. Has a five inch travel.

Three models fitting Atlas, Logan, 9" South Bend; can be adapted to most other bench lathes.

• Order from your dealer or write us for literature.  
**GENERAL DIE-STAMPING-TOOL COMPANY**  
Precision Collet Division, 262-272 Mott St., New York 12, N. Y.



side, President of the Society. The cancellation was the first to be made by a major technical society in 1945 and is in accordance with a general request made by James F. Byrnes, Director of War Mobilization.

In deciding to cancel the exhibition, the society, according to Burnside felt that the obvious advantages of speedy interchange of ideas and production development were more than offset by the transportation and housing emergency with which the nation is confronted.

Cancellation of the show will not affect the annual meeting of the society since

there is a constitutional provision requiring such sessions to be held. But it will be strictly a business session and there will be no display of tools or tool-making equipment.

#### SCREW THREAD GUIDE

Greenfield has published a unique booklet which presents in a concise and graphic manner all essential data on screw thread fits.

Layout of the booklet, called "Guide To Screw Thread Fits", is such that a single page covers all essential data on one particular size of thread with the corresponding NC and NF data for that size on facing pages. On one page are shown tap drill sizes, the recommended style of tap to be used to produce various classes of fits, the tap and product limits and tolerances, the thread limits for taps and limits for threaded products for various classes of fits.

The booklet covers NC and NF sizes from No. 3 Machine Screws thru 1" and also includes several introductory pages covering in non-technical language the general theory of screw thread fits.

Copies of this new 40-page booklet, may be obtained from the Service Literature Dept., Greenfield Tap & Die Corp., Greenfield, Mass.

#### BURR KEYSEATERS



Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

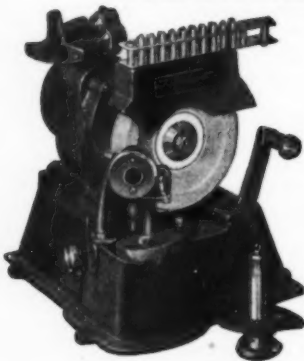
Write for Bulletins and prices.

**JOHN T. BURR & SON**

429 Kent Ave.,

Brooklyn, N. Y.

**POST-WAR PRODUCTION OF CIVILIAN PRODUCTS WILL REQUIRE QUANTITIES OF SMALL SHARP DRILLS. KEEP 'EM SHARP WITH A**



#### BLACK DIAMOND DRILL GRINDER

ONE Black Diamond Drill Grinder, in any manufacturing plant, will meet all production demands for accurately ground Small Gauge and Fractional Drills.

On this machine, any apprentice becomes a skilled operator . . . produces quantities of sharp drills, ground to perfection . . . with lips of uniform length . . . correct angle . . . proper clearance for accurate drilling.

Black Diamond Grinders cut grinding costs at least 50% . . . save expensive drills . . . reduce breakage . . . release skilled labor for more important work . . . quickly pay for themselves . . . and the Web Thinning attachment efficiently cares for Notched, Colton, or Crank Shaft Points.

If you use small drills, singly or in gangs—you can speed production and save valuable time with a Black Diamond Grinder on the job.

Write for full details.

**BLACK DIAMOND SAW & MACHINE WORKS, INC.**

45 NORTH AVENUE

NATICK, MASSACHUSETTS

YOU'LL SAVE FOUR WAYS WITH THESE

TRU-LINE

*Diamond Tools*



TRU-LINE multiple diamond tools require no turning. Machine down-time is reduced, production increased.

Diamonds are set in overlapping rows, providing a continuous and efficient cutting surface for the life of the tool—without changing, re-setting or adjusting.

Matrix forms a chemical bond with the diamonds, holding them securely until entirely used. Thin blade dissipates heat, safeguards the diamonds.

The effective use of smaller, carefully selected, high quality diamonds permits much lower diamond tool costs, yet assures efficient cutting.

TRU-LINE multiple diamond tools have consistently demonstrated their ability to deliver these four kinds of savings under all conditions of use on vital war material where speed, accuracy and finish are important factors. On many jobs they have completely replaced ordinary diamond tools.

There is a TRU-LINE tool for every type of straight, profile or step-dressing operation.

### Send For This Book

It gives complete information on TRU-LINE tools, shows how they save time and money. Your copy gladly sent on request.



## WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue  
Detroit 6 • Michigan

575 Langlois Avenue  
Windsor, Ont. • Canada

## STEEGE MOTOR DRIVES FOR DEFENSE GUARANTEED FOR FIVE YEARS

No chance of breakdown, doing a good job powering machines for defense production. No noise, floating cone, results 100% power. 8 years of production proof of durability. Easily installed.

PRICED AT \$40. AND UP. FOR LATHES, SHAPERS, MILLERS, ETC. IMMEDIATE DELIVERY. Send for descriptive pamphlet.

**W. L. STEEGE MACHINERY CO.**  
100 So. Jefferson St., Chicago, Ill.

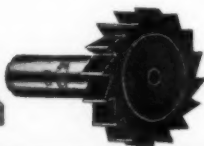
## KEO CUTTERS



Cutters of proven quality. Standard sizes in stock for immediate shipment. Special cutters made to blue print specifications.

Write today for prices.

Few territories open.

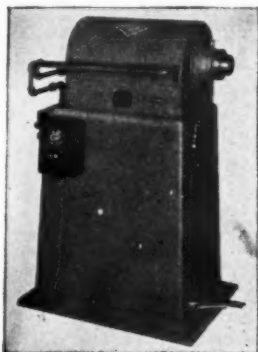


**KEO CUTTERS**

19326 Woodward - Detroit 3 Mich.

## SCHAUER SPEED LATHE

Single pedal control of full work cycle is one of the unusual features of this air-operated, heavy-duty, variable-speed Speed Lathe.



Another is application of air operation to the work spindle, which has a 1" clear hole thru it, for handling rod or bar stock, or long work pieces.

This machine will handle up to 1 3/4" maximum capacity collet. Step chucks, expanding mandrels, or special work-holding fixtures can also be used.

Motor operates continuously. Depressing the pedal closes collet, releases brake, and connects motor to work spindle thru a Twin-Disc clutch assembly. Air line is provided with control valve which permits time-lag before collet releases work.

Variations in spindle speeds are obtained thru the use of a Reeves drive, with control handle in convenient location for the operator. Spindle speeds, from a minimum of 100 to a maximum of 4800 rpm, (in a ratio of 6 to 1 or 12 to 1), can be selected. This new variable-speed Speed Lathe is designed for performing such secondary finishing operations as polishing, de-burring, filing or lapping of metal and plastic parts. It is made by the Schauer Machine Co., 2064 Reading Rd., Cincinnati 2, Ohio.

## GENERAL MILLS LOOKS AHEAD

The first formal preview of postwar plans for General Mills Mechanical Division is presented in a pictorial booklet entitled "Geared to Your Tomorrow," with a note of warning by Harry A. Bullis, President. "This book will answer some of the questions about future plans

# BRIGGS FILTERS *Earn* \$56<sup>00</sup> per 8-hour day, per grinder

**MAJESTIC TOOL & MFG. CO.**  
 MANUFACTURERS TOOLS, DIE, FIXTURES  
 TELEPHONE, PITTSBURGH 101 - 102  
 BRIGGS & BRIGGS  
 DETROIT 7, MICHIGAN

October 19, 1944

Briggs Clarifier Co.  
 Washington 7, D. C.  
 Gentlemen:

This is in reply to your inquiry regarding the results of tests of Briggs Coolant Filters used on our Parker-Injection Precision Grinders.

We have tested these filters on internal and external grinding operations and on thread grinding operations. The results are so satisfactory that we are standardizing on Briggs Coolant Filters for the machines in our own plant and for the machines which we manufacture.

On all grinding operations using a Briggs Coolant Filter, we have found that a much better finish can be obtained in 10% to 15% less time. We have reduced rejects from 10% to 2%, and by eliminating shut-downs for changing coolant in Briggs coolant circulating system, have increased the production time of the machine 15 to 20%.

All these improvements in finishing time per piece means savings in dollars and cents to us and to the users of our machines. For example, on one operation hourly production of finished parts was increased from 25 to 32 pieces. Each finished piece is worth \$5.50. This represents a daily saving of \$56.00 on this one operation alone! Similar performance throughout our plant will enable us to pay the initial cost of the filter in a matter of weeks.

Yours very truly,

MAJESTIC TOOL & MFG. CO.

William T. Friess  
 Chief Engineer



Majestic Tool & Mfg.  
 Co. grinder with Briggs

Z-1-A-R-S installed. This filter is for use on unit machine . . . models also available for central systems.

**These results, determined in the plant of Majestic Tool & Mfg. Co., prompted the management to include Briggs Filters as standard equipment on all the grinding machines they manufacture**

Wm. T. Friess, Chief Engineer of the Majestic Tool & Mfg. Co., attributes these extra earnings to the fact that Briggs Filters do a superior job of coolant filtration. Better finish is obtained in less time, coolant is changed only when it becomes rancid . . . coolant lines do not clog.

Investigate Briggs Filters today if you would like to increase the output of your grinders, honing and lapping machines, lathes. There is a Briggs distributor in your locality. Call him and let him tell you WHY and HOW Briggs can accomplish such results—or write manufacturer.

**DISTRIBUTORS IN PRINCIPAL CITIES — LISTED IN YELLOW SECTION OF TELEPHONE DIRECTORY**

**Briggs**  
 PIONEERS IN MODERN  
 OIL FILTRATION

**BRIGGS CLARIFIER COMPANY**  
 General Offices: Washington 7, D. C.



## The Standard of **QUALITY**

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest **quality** and **service** at **attractive prices**.

Write today for prices.

Few Territories Open.

**QUALITY TOOL WORKS**  
Market St., Waukegan, Illinois

for the Mechanical Division. However, our plant is at present completely occupied on war orders, and it is impossible to foretell when any degree of reconversion may be possible."

This booklet outlines two major fields of endeavor:—First, to produce for industry, precision devices, machines, tools, jigs, fixtures, and equipment, and further to offer the services of its development and engineering staff in devising new precision mechanical products.

Second, under the heading of "Better Helps for Homemakers," the booklet states that from the plant will come an entirely new concept of portable electric home appliances and home-making aids.

Background of the Mechanical Division—an outgrowth of the milling company's research in food processing and packaging machinery—is outlined, including the reason for its development, the story of how it evolved from a small shop with seven men to 1600 men and women in a few years, and what it is today—a large precision plant engaged wholly in war production with three Army-Navy "E's" to its credit and a thought to the future.



**Quick !  
Effective !  
Safe !**  
**ACETATE  
CLEANER**

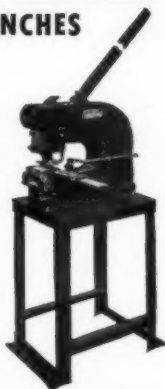
This all important cleanser is vitally needed by all workers for removing the dangerous film of dirt, grime and grease from their safety shields. Easily applied, greaseless, Sellstrom Plastic Cleaner acts promptly on all acetate surfaces. Comes in handy quart size cans.

**Sellstrom** Manufacturing Co.  
646-2 N. Aberdeen St., Chicago 22, Ill.

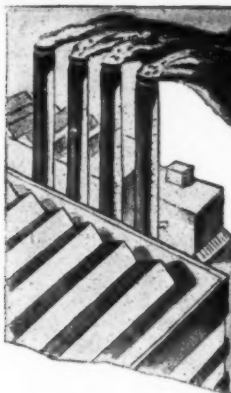
**WHITNEY-JENSEN PRODUCTS**  
30 YEARS EXPERIENCE

## NEW LEVER PUNCHES

Made in 7", 10", 18", 24" throat depths. All steel welded frame and sturdy welded steel stand. Powerful geared action. Capacity, 7½ tons. Throat height 6", die space 3¼". Standard equipment includes depth and side gauges, punch holder, die adaptors, die shoe, and one punch and die. A strong, versatile machine suitable for a wide variety of work.



**WHITNEY METAL TOOL COMPANY**  
115 FORBES ST. • ROCKFORD, ILL.



## DON'T LET PRE-WAR METHODS KILL POST-WAR PROSPERITY!

### HERE'S HOW WALKER-TURNER MACHINE-TOOLS CUT COSTS!

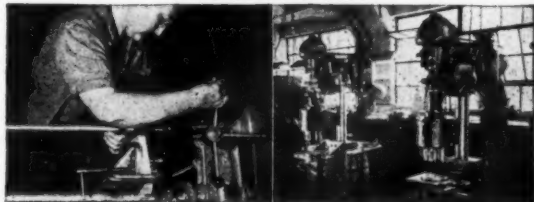


**260-5200 R.P.M.    60-5300 S.F.M.    160-8300 R.P.M.**

Wide range of operating speeds enables you to select the optimum cutting speed for any material.

The war years have proven to American Industry that the light machine tool has an important place in Production. Walker-Turner machine tools have demonstrated their ruggedness under most exacting conditions.

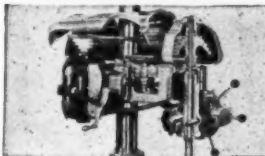
Don't let pre-war operating methods affect your post-war competitive position. The versatility of Walker-Turner machine tools will ensure production equal to—and, in many cases, better than—heavier and more expensive equipment.



Walker-Turner flexibility saves time and cuts costs in special tooling set-ups.

Set up horizontally, this Walker-Turner 15" Drill Press bores the ends of tubing.

This Walker-Turner 20" Drill Press drills five holes and reams two holes in one operation.



Low power consumption reduces operating costs.

This motor on a Walker-Turner 20" Drill Press provides speeds for drilling up to  $\frac{3}{4}$ " in steel, 1" in cast iron.



Low price decreases capital investment.

This Walker-Turner 4-spindle 20" Drill Press costs no more than a single heavy unit, yet has several times its production capacity.

**WALKER-TURNER COMPANY, Inc.**  
Plainfield    New Jersey



# MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS  
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES  
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & SHAFT SURFACES

*It Costs LESS  
to save equipment  
than to buy new!*

**L-R**

**FLEXIBLE  
COUPLINGS  
SAVE**



**L-R Type "A"**

for 1/8 to 50 h.p. Most  
widely used of all  
couplings. Others for  
duties up to 2500 h.p.

Send for Complete Catalog  
and quick-finding Selector Charts.

**LOVEJOY FLEXIBLE COUPLING CO.**

5026 W. Lake St.,

Chicago 44, Ill.

## *The Maintenance Man's Extra Arm*

The Simplex Util-A-Tool saves time on countless pull-  
ing, pushing, spreading, clamping, lifting and  
straightening jobs. Also used as a screw  
jack, arbor press, etc. Ask your dealer.

Templeton, Kenly & Co.

Chicago (44), Ill.

Better, Safer Jacks

Since 1899

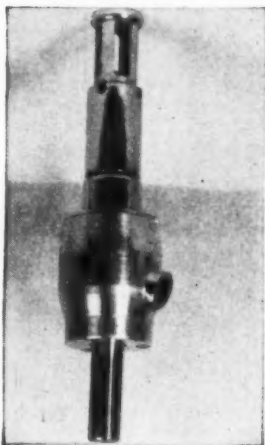


**Simplex**

LEVER - SCREW - HYDRAULIC

**Jacks**

## "O. W." CENTER SCOPE



A new series O. W. Center Scope is now  
available.

The body of this instrument is only  $3\frac{3}{4}$ "  
long, and it weighs approximately six  
ounces, making it handy to carry in the  
pocket.

The makers say it will locate any lay-  
out, no matter how fine the lines may be,  
and center it accurately to the axis of the  
spindle on any vertical or horizontal tool,  
thus taking the guess out of your work  
and correcting the error before it exists.

Anyone who has ever used a wiggler  
will have no difficulty in using the O. W.  
Center Scope as its operation is the same  
except that a proper lens system has been  
installed, allowing you to look down on  
your work and never at an angle. It is  
packed in a neat box.

For further information, write to Center  
Scope Products, 3829 San Fernando Road,  
Glendale 4, Cal.

## TRI-BIT BULLETIN

Their triangular cutter blade and its  
many applications are briefly described  
in an interesting 8-page bulletin issued  
by Weddell Tools, Inc., 1239 University  
Ave., Rochester, N. Y. Also included are  
complete specifications of Carbide Tipped  
Face Mills, particularly as applied to  
negative angle cutters.



## MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S.  
NAVAL AIRCRAFT FACTORIES

### BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10" Table; Model E.L. 12" Table.

**HARVEY MFG. CORP.**

161 GRAND ST., NEW YORK

Phone CAnal 6-5170

**BEWARE OF  
IMITATIONS!**

Our machine  
carries the Butterfly  
trade mark.



Registered U. S. Patent Office

## *The* **COLBORNE** *Speed Lathes*

### SPEED UP FINAL OPERATIONS ON DIES . GEARS . SCREWS . LONG RODS

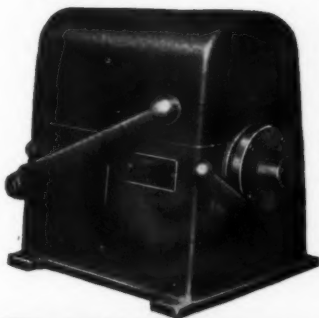
A recent addition to the COLBORNE line of Speed Lathes is the Series 30 machine. This speed lathe is indispensable for economical polishing, grinding, burning and lapping.

Very compactly constructed to do highest quality work with the COLBORNE features of spindle bearings running in oil, instant stopping brake, easy opening collet and standard speeds of 600-920-1720-3280-4800 RPM using  $\frac{3}{4}$  H.P. motor and cone pulleys. Collets and chuck may be used.

For more production per day choose COLBORNE.

**PROMPT DELIVERIES**

Write for Details Today.



**COLBORNE MFG. COMPANY**

BUILDERS SINCE 1879

157 Division St.

Chicago 10, Ill.

## Assuring UNIFORM RESULTS IN HEAT TREAT PRODUCTION



● The **NIAGARA Aero HEAT EXCHANGER** constantly maintains correct quench temperature, cooling or heating, as determined by the rate of heat input or load fluctuations. This is accomplished by the Niagara patented "Balanced Wet Bulb" control which automatically uses the correct mixture of fresh outdoor air with air re-circulated. The **NIAGARA Aero HEAT EXCHANGER** employs the evaporative principle of cooling, eliminating costly water bills and protecting the user from the risk of interrupted water supply. Its direct savings quickly repay for its installation. Write for Bulletins 90 and 96.

### NIAGARA BLOWER COMPANY

*Over 30 Years of Service in  
Industrial Air Engineering*

Dept. MT-25, 6 E. 45th St., N. Y. 17, N. Y.

*Field Engineering Offices in Principal Cities*



**AIR ENGINEERING EQUIPMENT**

### MAGNI-RAY MODEL C

The George Scherr Co., 122 Lafayette St., New York, 13, N. Y. announces an addition to the line of Magni-Ray products, illuminated magnifiers, designed to simplify and speed-up visual inspection operations. Model 'C' has been developed to serve for inspection work where it is necessary to observe a very wide field at one time.



It is encased in a casting made of aluminum alloy for ease in transporting the housing by means of a handle to the work or for fastening to a machine tool to observe turning and grinding operations. The lens, is 5" in diameter, is of high-grade optical glass and gives a clear, undistorted vision of the object under inspection. Housing is fastened to the 16" upright rod extending from base, by means of a universal clamping device, which permits swiveling up-and-down and side-ways.

Two 4" long 25 watt tubular bulbs are used, especially silvered so that light is reflected directly upon work without any loss of power. The base is covered with a deep green background to avoid eye-strain and for ease in inspection.

*dependable performance with*



**Janette**  
SPEED REDUCERS

## JANETTE SPEED REDUCERS

Your SLOW SPEED machines of from .08 r.p.m. and higher, 1/50 to 10 H.P., can be driven without using belts, pulleys, line shafts, chains, sprockets or slide rails, if you use one of the 47 types of Janette speed reducers.

WRITE for our 100-page Catalog TODAY.

Janette Manufacturing Co.  
556-558 W. Monroe St.  
Chicago, Ill.

## For Contour Grinding

● The Baker Model 3 Contour Grinder provides economical, rapid and accurate grinding and polishing of contours or irregular shapes. Provided with vertical reciprocal movement of spindle—3/16". Diamond dresser is standard equipment and is quickly mounted.



Capacity, diameter of wheels—1/2" to 4". Capacity, face of wheels—2" - 2 1/2" - 3". Diameter of table—18".

Write for illustrated circular.



## BAKER BROTHERS, INC.

Drilling, Boring, and Tapping Machines

TOLEDO, OHIO

EVERY ONE A "CHAMPION"

## CHAMPION EXPANDING MANDRELS

Twelve Champion Expanding Mandrels will do the job of hundreds of solid mandrels . . . completely and accurately filling any hole from  $\frac{1}{8}$ " to  $6\frac{1}{2}$ ". The flexible round sleeve on the tapered arbor automatically sizes to the most minute variation. Save time and reduce costs with Champion Expanding Mandrels.



The Only Mandrel That Completely and Accurately Fills the Hole.

The WESTERN Tool  
and Manufacturing Co.  
SPRINGFIELD, OHIO

**Bond**  
STOCK

# GEARS



SPROCKETS  
SPEED  
REDUCERS  
FLEXIBLE  
COUPLINGS

ARE LISTED IN OUR  
NEW CATALOG  
No. 61

CHARLES

**Bond**

COMPANY

617 ARCH ST.

PHILA. 6, PA.

## TOOL CRAFT EQUIPMENT

Tool Craft Co., 1835 Westchester Ave., New York 60, N. Y., announces a new line of ground tool steel, ready-cut die blocks, punch plates and stripper plates designed to help tool and die makers standardize and simplify operations.

Their ground stock is made of high-grade carbon water hardening steel and of non-shrink oil hardening steel. It is available in standard 18" lengths ranging in thickness from  $\frac{1}{8}$  to 1", with a variety of sizes designed to meet the most common requirements, particularly in larger sizes. It is uniformly annealed, precision ground, and easy to machine.

The ready-cut die blocks, made from the same high-grade types of steel, are intended to eliminate lost motion and waste of material. They are finish ground plus .005 to plus .010 for thickness, have two faces and two sides parallel, and the ends are squared. Sizes range from  $3 \times 4 \times \frac{1}{2}$ " to  $10 \times 14 \times 1$ ", with 18" lengths also available in any of the standard widths and thicknesses.

Punch and stripper plates are of cold rolled or machine steel ground minus .005 to minus .015 in numerous workable dimensions and in sizes to match die blocks. The sizes range from  $3 \times 4 \times \frac{1}{4}$ " to  $10 \times 14 \times \frac{3}{8}$ ", with 18" lengths also available from stock. Sides are parallel and ends squared. Reduction in cutting, shaping, planing and grinding stock is the object of this feature of the new Tool Craft line.

A new catalog section, containing specifications, sizes, other details and prices will be sent on request.

## DAYTON ROGERS CALENDAR

A handy new combination calendar and decimal equivalent chart, is now offered for free distribution by Dayton Rogers Mfg. Co., 2835-12th Ave., So., Minneapolis 7, Minn. In writing for one, use your company letterhead.

## Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular  
**NIELSEN TOOL & DIE COMPANY**  
1962 W. Eleven Mile Road,  
Berkeley, Mich.

*Presenting*

**A SUPER  
DIAMOND WHEEL**

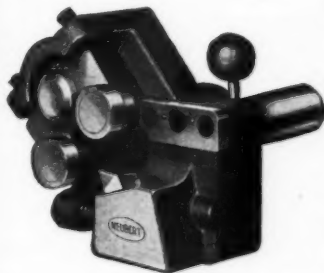
**CUTS MUCH FASTER — LASTS  
MUCH LONGER**

**Diamond Tools & Wheels  
To Your Specifications  
SEND US YOUR PROBLEMS**



**Free Engineering Service**

**DIAMOND WHEEL INDUSTRIES, INC.**  
57 E. JACKSON BLVD. CHICAGO 4, ILL.



**1"**

*Write for circular.*

**FOR FASTER STOCK REMOVAL,  
UNIFORM SIZE AND SMOOTH  
FINISH, you'll find NEUBERT BAR  
TURNERS fill the bill.**

They are easy to set up, hold to size, and operate with heavy cuts and feeds and roll the work to a smooth, burnished finish. Speed your production with NEUBERT BAR TURNERS.

**Three sizes.**

**Quick delivery.**

5/8" capacity .....	\$ 68.00
1" capacity .....	85.00
1 3/4" capacity .....	110.00

**NEUBERT MACHINE COMPANY**

*Precision Cutting Tools*

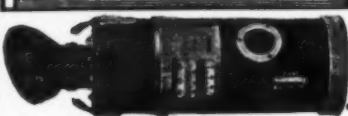
**341 W. Willow, Long Beach 6, Calif.**

## JONES BULLETIN 44-1

Bulletin No. 44-1, published by Jones Motrola Co., Fairfield Ave., Stamford, Conn., manufacturers of tachometers and other industrial products, describes four models of individual-mount tachometers and multi-range portable hand tachometers.

The bulletin shows views of the individual tachometers, rpm ranges available, mounting dimensions, and includes prices for tachometers and appurtenances, a section on use and operation, and general installation data.

## PYRO THE SIMPLIFIED OPTICAL PYROMETER



Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

**THE PYROMETER INSTRUMENT CO.**  
102-105 Lafayette St., New York, N. Y.



FOOT  
CONTROL  
SWITCH



## STREAMLINED 4-SPEED REAMER DRIVER

Complete with meter . . . 4" four-jaw universal machine tool chuck and foot control switch. Capacity from  $\frac{1}{8}$ " to  $1\frac{1}{2}$ " reamers. Four speeds . . . 30—45—72 and 115 RPM. Higher speed ranges available. Eliminates handwork. Speeds production. Mail your order today. The new Greaves streamlined reamer-driver will come your way—prompt!



**The Greaves MACHINE TOOL CO.**

2013-3 R.D. Eastern Ave.  
Cincinnati, Ohio



## V-BELT DRIVES

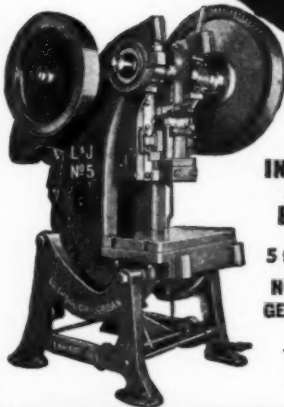
An unusually complete V-belt drive catalog (B6051E)—with all of the required information to make correct drive selections reduced to handy charts, tables and drawings—has been released by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Newest V-belt drive product covered in this Texrope drive engineering summary is the Company's new "Magic-Grip" sheave, designed for fast, easy mounting and dismounting. A quick-picture story of the sheave and complete facts for applying are offered.

Another section covers the Texrope "Econograph" method of drive selections, now widely used where drive designing is frequently necessary. Most important considerations in the design of any V-belt drive—driving sheave diameter and belt size—are readily determined with aid of the Econograph.

List prices, stock sizes, dimensions and construction details are included for all Texrope drives. Additional descriptions cover application of Texrope Vari-pitch sheaves and drives and the Vari-pitch speed-changer.

Standard Since 1911



## INCLINABLE POWER PRESSES

5 to 79 tons  
NO. 5 BACK  
GEARED TYPE

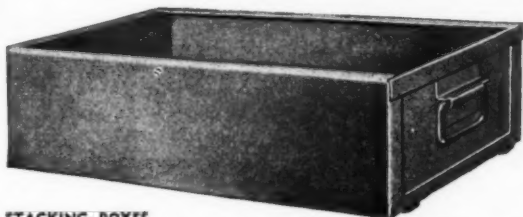
Write for  
catalog.

## L & J PRESS CORP.

successors to Lushbaugh-Jordan Tool & Machine Co.  
1625 STERLING AVE. ELKHART, INDIANA

**IMMEDIATE SHIPMENT!**

# STEEL BOXES



*for your  
Production  
Needs*

## STACKING BOXES

Just right for your small parts. Light in weight, easy to handle. Equipped with drop handle each end. Runners save wear on bottom of box and act as positive stacking lock.

No. 301—6" x 9" x 3½"	— 20 Gauge.....	\$ .55
No. 302—8" x 12" x 4"	— 20 Gauge.....	\$ .60
No. 303—9" x 13½" x 4½"	— 19 Gauge.....	\$ .75

Prices F. O. B. Factory, Philadelphia

## AMERICAN METAL WORKS, INC.

1502 GERMANTOWN AVENUE

PHILADELPHIA 22, PA.



## Get 3 to 5 Times MORE WEAR PER GRIND!

**CIRCULAR RELIEF GRINDING  
LEAVES NO "LAND" . . . GIVES YOU  
LONGER-LASTING EDGES**

With more metal left, cutting edges are more adequately supported. Total output per tool is thus increased many times. By this method fewer shutdowns for regrinding are necessary. Each regrind is better than the original "factory" grind.

With one machine—the Circular Relief Grinder—and in one simple operation, tools can be efficiently sharpened. So simply does it operate that even inexperienced men can handle it. Any kind of reamer or tap including Bent Shank Taps of any size can be ground faster and more accurately with it than by hand. Get further details on the Circular Relief Grinder!

### THE CLEVELAND TOOL ENG. CO.

1249B West Fourth St.

Cleveland, Ohio

### SEND COUPON TODAY.....

THE CLEVELAND TOOL ENGINEERING CO.  
1249B West Fourth St., Cleveland, Ohio

Please send me Data Sheet B giving full information about the Circular Relief Grinder at no cost whatever.

NAME .....  
ADDRESS .....  
CITY ..... STATE.....

Machinists — Tool and Die Makers — Sheet Metal Men — Pattern Makers — Get  
**FREE SAMPLE — TAMMS LAYOUT DOPE**

in Blue, Black, Orange, Red

Speeds layout time on brass, aluminum, copper, tin, stainless steel. Oil resistant. Won't chip, crack or flake off. Comes in handy 8 oz. bench type brush-in cans. Also pts., qts., gals., drums. Order now!

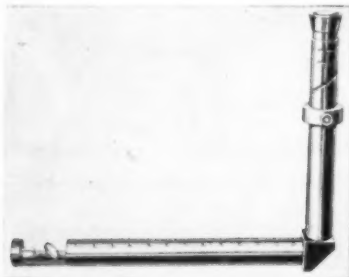
**TAMMS SILICA CO.**

228-HM N. LaSalle St.  
 CHICAGO 1, ILL.



**POLAN BORESCOPES**

Originally designed for internal surface inspection of gun bores, Polan Borescopes are now available for use by private industry.



Borescopes make the surfaces of long bores visible to the human eye in order to inspect for minute cracks or other surface faults which may cause failure in operation.

They are recommended particularly for close scrutiny of internal surfaces of bored engine shafts, tubular bodies, hy-

draulic and other cylinders, etc., and will cover a diameter range from 13/16 to 9", and a bore length up to 30'.

The instruments combine the qualities of a highly corrected lens system and excellent interior illumination with the rugged design which is necessary for every-day machine shop use. They supply a clear and magnified view of bore surfaces, do not strain inspector's eyes when operated continuously, and require no special operator training.

A number of special borescopes and a wide variety of attachments have been developed, which are described in bulletin No. 530 obtainable upon request from Polan Industries, Huntington, W. Va.

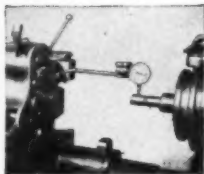
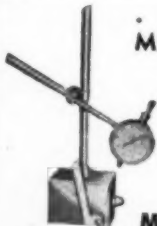
**PLATE FABRICATION**

The five major advantages claimed for steel plate fabrication when used in the construction of bases, columns or frames of machine tools; rigidity, durability, adaptability, appearance, and economy, are interestingly set forth in a new, four page, two color folder issued by Central Boiler and Mfg. Co., 5813 Rivard St., Detroit 11, Mich.

The folder, illustrated by photographs of a number of steel fabricated machine tool bases showing the simple, attractive lines attainable with this method, is available on request.

**... A NEW SUPER POWER  
 MAGNETIC INDICATOR BASE**

Newly designed magnetic base has twice the strength of other indicator bases now on the market. Provides quick easy indicator settings in any position. Eliminates clamps and fixtures. Will positively hold the indicator at extreme end of rod in vertical or up-side-down positions, even thru paint or grease. A release handle permits easy removal of the base without danger of marring the work. A trial will convince you that this item is not "just another novelty." Write for details.



**MAIN ELECTRIC COMPANY, INC., Rochester 2, N. Y.**



**CHAMPION**  
*Diamond Wheel Dressing*  
**TOOLS**

OUR NEW

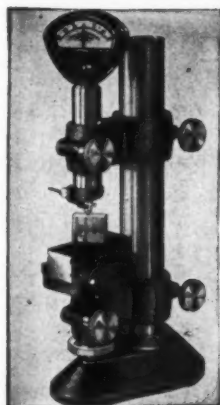
**CHAMPION**  
 13 YEARS EXPERIENCE **DIAMOND COMPANY - NEW YORK**  
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 551 FIFTH AVE., NEW YORK 17, N. Y.

**HARGRAVE** **Clamps**

To obtain greater output, save time, perform work easier, requires the right clamp for every job. In design and construction, HARGRAVE Clamps have kept steady pace with production needs of industry. Write for catalog showing complete line of Clamps, Chisels, Punches, Washer Cutters, File Cleaners, etc.

**THE CINCINNATI TOOL CO.**  
 Founded 1879  
 1945 Waverly Ave., Cincinnati 12, Ohio

*The* **CINCINNATI TOOL Co.**



Made in 4 SIZES

# MIKROKATOR "MIKRO"(MINUTE) FRICTIONLESS AMPLIFICATION

Complete elimination of friction, lag, and backlash insures positive, dependable repeat readings. Pointer responds instantly to the slightest movement of measuring tip; no swinging past true reading, no waiting for pointer to come to rest. No lights or electro magnets, no warm-up period required. No electrical connections, can be readily moved to different locations. **GRADUATED:** .0001" to .00001"; .001 mm to .0002 mm.

Write for CIRCULAR — BB

**RAPID**  
**RELIABLE**  
**SENSITIVE**  
**LIGHT**  
**COMPACT**  
**STURDY**

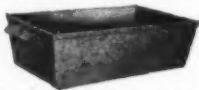
**SWEDISH GAGE CO. OF AMERICA**  
 8900 ALPINE AVE., DETROIT 4, MICH.

### KUM-KLEEN STICKERS

A new method of masking name and instruction plates, now widely used in war plants, has been developed by Avery Adhesives, 451 E. Third St., Los Angeles 13, Cal.

These Stickers are now die-cut to the exact specifications of the manufacturer. Name plate is attached to the product on the production line, covered with Kum-Kleen Pre-Cut Masking Sticker, then painted or finished. Heretofore it was necessary to pre-cut masks by hand or return products to production line to have

### New Nesting Type Tote Pans



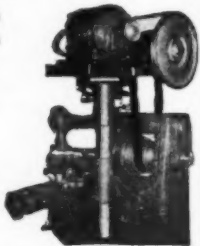
20" long x 12" wide x 6 1/2" deep.  
16 ga., drag holes and handles both ends.

**J. L. LUCAS & SON, INC.**  
BRIDGEPORT, CONN.

## MODERN...

### MOTOR DRIVE

**Prompt  
Shipment**



Save floor space, save power, and eliminate line shaft expense by installing MODERN MOTOR DRIVES in your plant. All drives are ball-bearing equipped and designed to fit practically every machine tool. Soundly engineered for long life.

**MODERN MOTOR DRIVES DIV.**  
NICHOLS ENGINEERING CO.  
2400 W. MADISON ST., CHICAGO 12, ILL.



the name plates attached after finishing. These Stickers, are applied without moistening, stick to any smooth surface, are not affected by heat or cold and easily peel off without leaving a trace.

## The CRITERION Carbide Tool Grinder

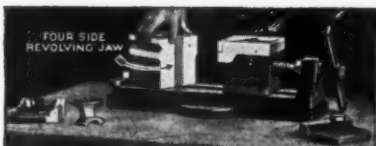
**GREATER  
PRODUCTION  
CAPACITY**



Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P. balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 grit 7" dia steel backed silicon carbide wheels. Ideal for metal bonded or Resinoid bonded diamond wheels.

Order from your dealer or write direct. Request literature. No obligation.

**CRITERION**  
MACHINE WORKS  
BEVERLY HILLS, CALIFORNIA



## SAVES LABOR

You will eliminate many costly hours from your Payroll by using the JACKSON TIME-SAVING VISE. It saves the time wasted by your Machinists in hunting for Bolts, Clamps, Angle Plates, etc., when rigging up work on the Drill Press, Miller, etc. Of still greater importance is the saving in output you effect by not having your productive machine standing idle during the rigging up process, for the —

### JACKSON TIME SAVING VISE

by means of its revolving jaws and supplementary jaws instantly holds the thousand and one shapes that arise in machine work.

SEND FOR BULLETIN NO. 23-B

**BROWN ENGINEERING CO.**

126 N. THIRD ST. READING, PA.

# BURKE

## MILLING MACHINES

Make Fast Work of Small Jobs

Motor  
Driven

Timken  
roller or  
ball bear-  
ings to  
spindle

Write today for  
circulars.



**Burke Machine Tool Co.**

297 E. 16th St.,

Conneaut, Ohio



**NO BUCKING  
-NO BREAKING**

**STRONGER SUPPORT —  
GREATER PRODUCTION SPEED**

The very day you install PADDOCK BALL-BEARING BAND SAW GUIDES you'll find these facts true:

- (1) **Blade breakage reduced.** Four wheels turning with the blade provide strong frictionless support.
- (2) **BAND-SAWS can cut greater thicknesses of material.** Almost no limit to quantity of materials cut.
- (3) **MAKES OLD OR NEW BAND SAWS MORE EFFICIENT.** Ball-Bearing wheels are inter-changeable — increasing life of the guides.

Write today for One or More Sets on 10 DAYS FREE TRIAL.  
Get prices and circulars.

**PADDOCK TOOL COMPANY**

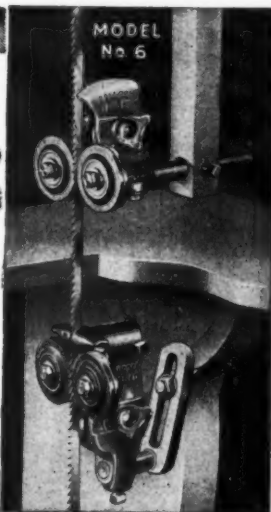
Guide Makers Since 1920

1418 Walnut Street

Kansas City 6, Missouri

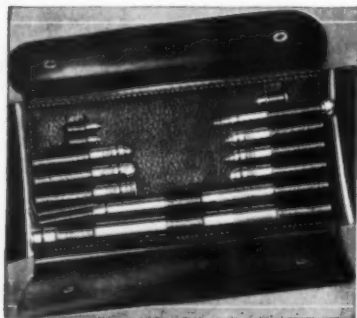
**Paddock**  
BALL-BEARING  
BAND SAW GUIDES

**Guided and Guarded by 6 Safety Points**



### DIAMOND TOOL KIT

An innovation in diamond tool packaging, the General-Purpose Diamond Tool Kit, is announced by the Abrasive Dressing Tool Co., Detroit.



The Abrasive G-P or "jeep" Kit, as it is shown, contains an assortment of diamond tools to meet practically every requirement of medium-sized and small

shops, conveniently presented in a handy, durable, self cover kit. The kit consists of 10 diamond tools, two tool holders and two keys for locking tools in holders. Included are diamond dressing tools, radius tools, cutting tools, phonopoints and a diamond scriber.

Each kit bears an identification number and provides a separate compartment for each tool, facilitating inventory and preventing loss. It is available for immediate delivery.

### LAKE SHORE TOOLS

Information of practical value to users of machine tools is presented in a compact, 116 page catalog released by the Lake Shore Tool Works, 816 N. Kostner Av., Chicago 51, Ill. The catalog is divided into seven general sections, devoted to the following lines:— Milling Cutters, Hobs, Gear Cutters, Broaches, Miscellaneous Tools, Carbide Tipped Tools, and Other Special Tools.

Large, clear illustrations are supplemented by concise descriptions and well organized dimensional and price information. Copies may be obtained by requests written on company letterheads.



## GOOD PROFITS ON FUSSY LITTLE JOBS

Too often, small intricate toolroom jobs run up costs far beyond reason. One way to prevent this . . . and also to keep work moving through the shop . . . is to schedule such work on a LINLEY.

This compact Milling and Jig Boring machine is correctly designed for high speed and accuracy in die work, models, metal patterns, jigs and drilling, milling and reaming operations.

Choice of 8 spindle speeds (to 4250 r.p.m.); anti-backlash quill travel, velvet feed, micrometer setting, grease-sealed bearings, floor space 18½"x20", table 7"x17½".

Save your large machines for rated capacity; save tool-makers' time; earn profits on small work . . . install a LINLEY.

DETAILED BULLETIN ON REQUEST

# LINLEY

**BROTHERS CO.**  
663 State St. Extension  
BRIDGEPORT 1, CONN.

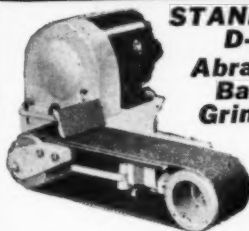


### ANNIS ELECTRIC ETCHERS

(for precision work)

with the stylus that stays cool

**R. B. ANNIS CO.**  
INDIANAPOLIS 2, IND.



### STANDARD D-4 Abrasive Band Grinder

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36 1/4" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW  
MANUAL ON FINISHING—WRITE TODAY

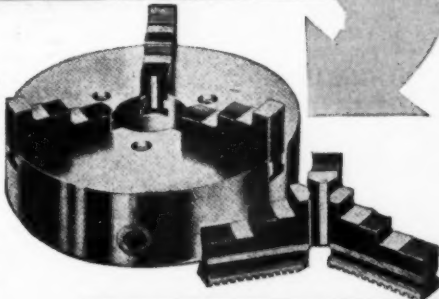
**WALLS SALES CORP.**  
96 Warren St., New York, N. Y.

# ALMOND

## GEARED SCROLL LATHE CHUCK

Bodies are one piece construction of close grain nickel alloy castings. Jaws are made of special alloy—steel hardened through.

Manufactured in sizes from 4" to 15" diameters. Furnished complete with two sets of Jaws.



*Complete Details  
on Request*

**T. R. ALMOND CO.**

ASHBURNHAM,

MASS., U.S.A.

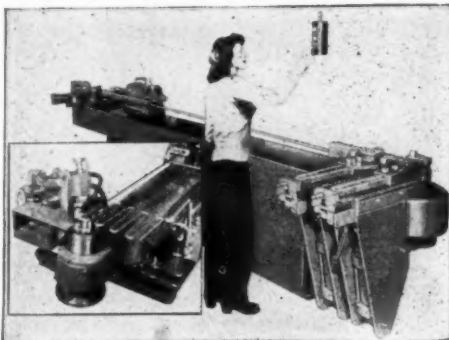
## PINES SMALL AUTOMATIC BENDER

Pines Engineering Co., 600 Prairie, Aurora, Ill., announces a new small size, high speed, full automatic bender for handling tubing up to 1" O.D.

It was developed especially for the tubular furniture, refrigeration and heating industries and others where high production bending of small diameter tubing is required.

When equipped with a multiple angle selector, this bender will make up to 50 tubular chairs per hour with 8 bends in each chair.

A special application has been developed for making serpentine coils, as shown. It incorporates booster attachment for automatically advancing coil to position for the next bend. The bender completes the entire cycle and returns, to starting position, including automatic ejection thru momentary contact of the start button. Production up to 600 bends per hour in coils from  $\frac{5}{8}$ " O.D. copper tubing are thus made.



The company makes five sizes of automatic benders, capable of handling pipe and tubing up to 4" diameter, bar stock, moulding, angles, channel, etc. An 8-page catalog is available on request.

## AMES CATALOG NO. 53

A 60-page Catalog No. 53 on Gauge and Dial Indicators for impersonal measuring size control and general testing has been released by B. C. Ames Co., Waltham, Mass. A foreword outlines purpose of the catalog, stressing the importance of quality dial indicators and gauges. It also describes the models which for years have proved to be best adapted for general testing and measuring.

A simplified format features ready reference and ease of selection of the many available stock models. New models include several long range indicators, portable types of Dial Micrometers, the No. 13B Comparator, and new developments in Dial Test Indicator sets.

## ALL ALLOY PORTABLE SHEARS

FULLY  
GUARANTEED



No. 1 cuts up to No. 11 gauge strip or sheet.  
No. 2 cuts up to  $\frac{1}{4}$ " steel plate.

Special Blades for shearing stainless steel.

**BREMIL MFG. CO.**

720 Pittsburgh Ave.,

Erie, Pa.

## "STAR DUST" LABORATORY GRADED PURE DIAMOND POWDERS

For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These factors make STAR DUST indispensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN CARBIDE, CHROME.

- Absolute control of particle sizes
- Complete absence of out-size particles
- STAR DUST sizes as fine as .0001"
- Complete range of grit sizes

There is a STAR DUST Field Serviceman in your territory.

**ACE ABRASIVE LABORATORIES**

ONE SPRUCE STREET  
NEW YORK 7, N. Y.

STAR DUST speeds up production enormously and produces finishes and superfinishes down to less than .0000004 of an inch.

**Precision LAPPING  
POWDERS for  
PRECISION work**



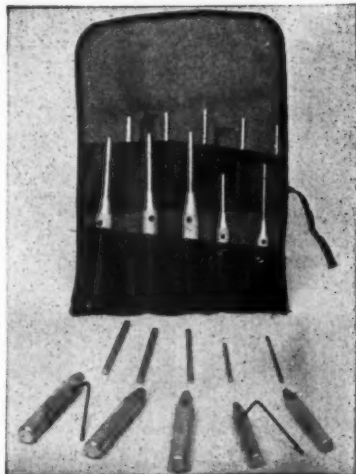
## KELLER PIN PUNCHES

Here is an innovation in Pin Punches designed to save time and money. It is a punch body with replaceable, removable inserts for every purpose. These inserts are made of a specially tempered steel that is tough and durable and may be purchased in lengths to fit your need. The inserts come in diameters of 3/32, 4/32, 5/32, 6/32 and 7/32".

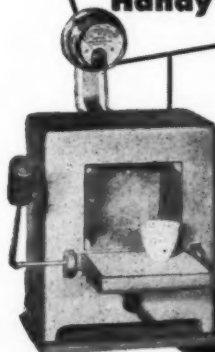
Base of the insert hole in the punch body ends at the inner side of the set screw hole; this provides a way to remove a broken insert.

The punch body itself comes in 2 diameters: 3/8" to fit the 3/32" and 4/32", and 1/2" to fit the 5/32", 6/32", and 7/32" inserts. The body is also made of this tempered steel, cadmium plated, and may be used indefinitely, as the inserts may be replaced at a very low cost.

Punches and inserts come in complete sets of five bodies and 10 inserts in a handy leatherette case. Both punches and inserts may be purchased individually from Keller Tool & Supply Co., Dept. A, 1364 Poplar Ave., Memphis, Tenn.



## \*Uniform Temperature Fast Heating Portable) Handy



• The heating element in the Temco furnace operates with unusual speed. A working temperature of 1500° F. is attained in only 30 minutes and intermittent peak loads of 1850° F. are within the practical range of this rugged, long life furnace. A four point switch provides temperature control in four ranges and adjustable rheostat bands allow close heat selection within any range. The accurate, dependable pyrometer is calibrated to 2000° F. and 1100° C. in 50° increments.

\*MUFFLE CHAMBER has the exclusive feature of an embedded heating element which covers all four sides of the heating chamber. This eliminates "cold spots", assures a uniform temperature in every part of the chamber, and protects the elements against damage and oxidation.

Temco furnaces are built for either 115 V. or 230 V. Current consumption 1200 watt maximum. Heating chamber 4" wide, 3 3/4" high and deep. Outside dimensions 8 3/4"x13 1/2"x10". Shipping weight 30 lbs.

COMPLETE WITH PYROMETER (115 V.).....\$42.50

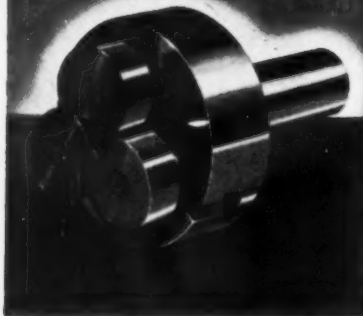
For 230 V.—\$5.00 additional

See your supply house or write

THERMO ELECTRIC MFG. CO., 486 W. Locust St., Albuquerque, Ia.

# TEMCO ELECTRIC FURNACE

## A New Tool



### FOR INSIDE BORING FOR OUTSIDE TURNING AND BURNISHING OF BAR STOCK

The new White Box Mill will increase production in turning, boring and burnishing of bar stock. It is extremely accurate and has no moving parts. Circular tools on the face can be ground and reground as much as 300 to 500 times assuring long tool life.

The White Box Mill is ruggedly constructed and will handle heavy cuts and feeds in sizes from 1/16 to 3/4 inches with fast setups and adjustments. Quick delivery.

*Distributors wanted, write for particulars.*

**GEO. W. WHITE**

P. O. BOX 369  
RAVENNA, OHIO

## ARC ETCHER BULLETIN



The complete line of Tracer-Controlled Electric Arc Etchers offered by the George Gorton Machine Co., 1409 Racine St., Racine, Wis., is described in detail in their new eight-page booklet, No. 1635-B. Gorton single or multiple head etching machines are used for light or deep etching on all kinds of metal of practically any size, and this profusely illustrated booklet tells the complete story of the versatility and universal application of the Gorton machines. Listed also are complete specifications and many applications of the Gorton "Spit-Fire" Etcher.

### TECHNICAL BOOKS CATALOG

A new catalog of technical books has been issued by The Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, N. Y. It includes the latest books on chemistry, technology, physics, general science, mathematics, engineering, metals, technical dictionaries, etc.

This catalog gives date of publication of each book as well as price, number of pages, detailed descriptions and full table of contents.



## CUB

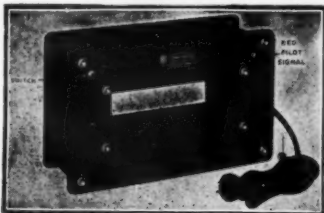
### VARIABLE SPEED TRANSMISSION

For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. See your dealer or write **\$16.50**  
(3 Types—8 sizes to choose from)

**Standard Transmission Equipment Co.**  
3409 VERDUGO ROAD LOS ANGELES, CALIF.



## AMC DEMAGNETIZER A TOOL ROOM NECESSITY



Every tool room needs this simple, portable, sturdy demagnetizer. Small parts passed through the powerful AMC field are instantly demagnetized. Large, flat surfaces can be demagnetized by sliding the device over the surface.

Price is only \$32.50, complete as shown.

Write for full information.

ALOFS MFG. CO., 1629 Madison Ave. S.E.  
Grand Rapids, Mich.

## IMMEDIATE DELIVERY

3,000 New Steel Stacking Boxes



Illustration  
Shows  
boxes  
Stacked  
3 High

Well  
constructed

\$2.00 each, F.O.B. Chicago

24"x15"x7½—18 gauge. Drop handles  
both ends. Lots of 25 or more.

**PASSMAN BROTHERS**

1101 W. Lake St.

Chicago 7, Ill.

*Ever* USE A VISE  
IN PLACE OF  
A SPECIAL FIXTURE?

Special milling and drilling fixtures can often be dispensed with and much money saved by simply using a Presto-Vise with special jaws. In many cases the savings run as high as 75% as compared with the cost of special fixtures.

Instead of scrapping fixtures after every job, you can use the Presto-Vise over and over again by merely changing jaws.

**Free  
CATALOG**

Write for complete information.

**D. A. SMITH & CO.**  
57 Selden Detroit 1, Mich.



"Clutch" Type,  
Toggle Action

For clamping parts  
of varying thickness.



"Side-Action"  
Toggle Type

For clamping parts  
of uniform thickness.

**PRESTO-VISE**

## MASTER SERIES DOALL GAGE BLOCKS

A new and complete DoAll Gage Set No. 118 is designed for the gage department that requires a complete set of gage blocks. This master series will not only provide for more duplicate combinations of the same size, but makes possible a wide range of combinations.

To overcome the dimensional limitations of standard sets of gage blocks, Continental Machines, Inc., 1300 S. Washington Ave., Minneapolis 4, Minn., has introduced Set No. 118—Master Series. This series serves for five distinct applications.—It is well represented by so-called thin blocks. These range in size from .010 to .090" and include a thin block series in steps of 10 one-thousandths of an inch from .010 to .090". A second series in steps of one one-thousandth of an inch is from .021" to .029". A third series in steps



of one ten-thousandth of an inch runs from .0201" to .0209".

The master series is well represented by standard gage sizes. The first series is in steps of one ten-thousandths of an inch from .1001" to .1009". The next series is in steps of one-thousandth of an inch running from .101" to .149". The fifty-thousandths series covers all sizes from .100" to .950", and the inch series runs from 1.000" to 4.000" inclusive.

Because our measuring systems are based on fractions, a series of three fractional size gages, 1/32, 3/64 and 1/16", combined with six of the standard blocks permits a combination of every fraction in steps of 1/64" from 1/32 to 2-47/64" inclusive.

Standard gage block sets are provided in steps having a minimum increment of one ten-thousandth inches. Many times it is necessary to set-up a combination having a dimension of one-half ten thousandths or 50 micro inches. The master series makes this possible by the inclusion of two half-ten-thousandth gages in .01005" and .10005" sizes.

Special gage blocks called wear blocks protect regular gages when they are used under conditions which might cause excessive wear. The master series set includes two tungsten carbide wear blocks of .050" size. Please address the makers for additional details.



# THIS IS NEW

The arrows indicate the path of the magnetic flux in the new

### POWERGRIP MAGNETIC CHUCKS

Uneven or odd shaped pieces are held as shown with plain steel blocks (the black blocks are solid).

These chucks have often returned their cost, by holding work without expensive jigs or fixtures, on one job.

Furnished complete, ready to plug into 110 Volt A.C. light circuit, with reversing control. Nothing more to buy. Complete unit easily portable. **GUARANTEED.** Write for information or send print for details.

**Rockford Magnetic Products Co.**  
1312 - 18th Ave.      Rockford, Ill.

### RIVETS PAIL EARS

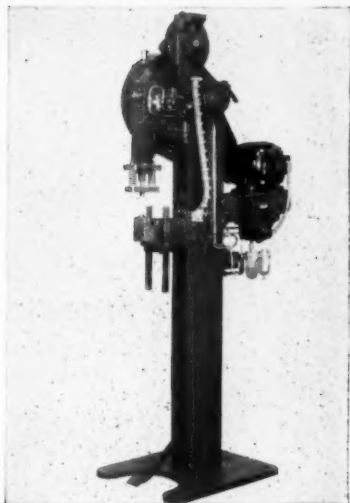
Three operations are performed at one stroke of the ram with this electrically-powered T-J "Rivitor", specially adapted to the job of piercing, dimpling and riveting bail ears on pails, using 1½ lb. tinners rivets. It is manufactured by the Tomkins-Johnson Co., Jackson, Mich.

Rivets are underfed by the machine, as on a standard underfeed "Rivitor". The unpierced pail and ear are placed over the rivet and properly located by gages.

When the ram rescends, a combination piercing and dimpling die mounted on a spring-actuated pressure pad attached to the ram, forces work over the rivet, piercing and forming a dimple in pail and ear.

Dimple is deep enough to prevent manufactured head of rivet from projecting inside pail. At end of down stroke of "Rivitor", the rivet set (not visible in photo because of the pressure pad) forms a slightly rounded head on rivet.

The company also manufactures air-powered machines for aircraft riveting; air and hydraulic cylinders, clinchers, die sinking milling cutters and air controls.



### 5 MINUTE JOB IN 5 SECONDS



*Jiffy*

### GRINDING WHEEL DRESSER

*"Just a twist  
of the wrist"*



The JIFFY is a time saver for accurate dressing of grinding wheels. It is easily attached to any surface grinder . . . becomes a part of the machine. Dresses absolutely true with a "twist of the wrist", in 5 seconds, whether wheel is near chuck or way above it . . . and without disturbance to set-up. Well finished, hardened and ground (except bracket) . . . a money-saver in any plant. Write for Bulletin 602 W.

Manufactured by **FLORIAN MFG. CO.**, Plantsville, Conn.

DISTRIBUTED BY

**AMERICAN STANDARD CO.**

Southington, Conn.

**POWERFUL**  
But so **ACCURATE**



**DIE MAKERS  
MACHINERY**  
"THE TOOLMAKERS  
BEST FRIEND"

**GROB BROTHERS**  
GRAFTON - WISCONSIN

**New Britain  
UNIVERSAL VISE**  
**THE ORIGINAL**

Swivels 360 degrees horizontally,  
100 degrees vertically, to  
give any angle or com-  
pound of  
angles.



*Write for  
Further  
Information.*

**NEW BRITAIN TOOL & MFG. CO.**  
NEW BRITAIN, CONN., U. S. A.

**LUMA**  
Combination  
Etchtool —  
— 3 —  
Tools  
in 1



*Luma Marking and  
Demagnetizing SIMULTANEOUSLY*

Writes on hardened steel — demagnetizes at  
the same time—with carbon point does light  
spot annealing and soldering jobs. Compact—  
easy to use—dependable.

*Send for details—5-day FREE TRIAL OFFER!*

**Luma Electric Equipment Co.**  
Dept. H P. O. Box 132, Toledo 1, Ohio

**NIELSEN**  
**Heavy Duty**  
*Live  
Centers*



*Write for  
catalog on  
live centers*

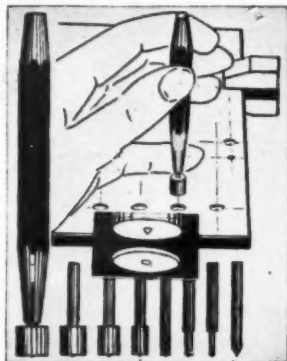
Adapted  
for heavy  
duty work.  
Precision type  
ball and roller  
bearings assure  
maximum capac-  
ity for high speed  
production and long  
service.

**NIELSEN, INC.** LAWTON, MICH.

## TEMPLATE TRANSFER PUNCHES

Allen Template Transfer Punches are now available to industry generally, according to the manufacturer, H. D. Allen, 3201 Casitas Ave., Los Angeles 26, Cal.

These punches offer a number of definite advantages:—points are uniformly concentric with bodies and are accurate to size within .0004", insuring accurate centering even by apprentices. A wide range of sizes may be stocked at low cost. Additional punches and replacements are readily available. Saving in weight and bulk is achieved by employing punches which, used with a universal holder, are only a fraction of the size and weight of solid type punches. Octagonal holder also takes a scribe, prick punch, etc., is of comfortable size and proper weight, and cannot roll. These Punches, in a complete range of sizes, occupy little space and represent a small investment.

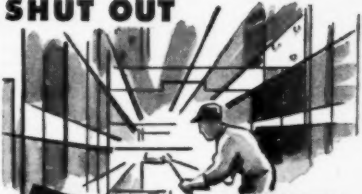


Three types are available from stock. Punches for light gauge templates are made in 19 standard diameters from .040 to .375"; points are .020" high; one holder serves for all punches. Heavy duty punches are made in 7 standard diameters from 1/8 to 1/2" and have a universal holder; the points on these punches are several times larger than those of the punches for light work. Solid type punches are made in 7 sizes from 1/8 to 3/8". Special types and sizes are made on order.

## SILVER SOLDERING FLUX

A new 4-page bulletin issued by Superior Flux Co., 913 Public Square Bldg., Cleveland, Ohio, describes Superior No. 6 Flux for silver soldering (patented), and gives detailed instructions for its use. This

## FACTORY NOISES SHUT OUT



When you 'phone  
in a BURGESS  
ACOUSTI-BOOTH

NOW available . . .  
subject to prior sale

Telephoning in a Burgess Acousti-Booth is simple and convenient...no doors to close...no stuffiness or cooped-up sensation. You just step into the booth, pick up the receiver, and the incoming message can be heard CLEARLY...without interference from surrounding noises.

Ideal for busy shops and factories... saves time...saves costly errors through misunderstood orders. Light, airy, easy to keep clean. Send for your free illustrated Acousti-Booth booklet today.

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Chicago 18, Illinois

Please send illustrated booklet describing the Burgess Acousti-Booth.

NAME .....

FIRM NAME .....

STREET-CITY .....



## A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in  $\frac{3}{16}$ " to 1" diameters. *Send for pricelist.*

**HEIMANN MFG. CO.**

332 Lincoln Ave.

Urbana, Ohio

## WAR or POST-WAR

### Production Capacity

We are now in position to take on some additional work. Our plant is ultra-modern with finest equipment. Our staff has had more than 34 years of experience in management, engineering, designing and production—skilled in handling war contracts for large firms—quickly and efficiently.

### SEND BLUEPRINTS FOR QUOTATION

Use Our Complete and Modern  
DESIGNING, ENGINEERING, DRAFTING  
and INSPECTION Service and Equipment

### DEFIANCE METAL PRODUCTS COMPANY

Contract Die and Tool Work  
Commercial Stampings  
Zachrich Bldg., Defiance, Ohio  
Telephone 170

## MADE OF ALLOY STEEL MILLED FROM BAR

### SOCKET HEAD CAP SCREWS



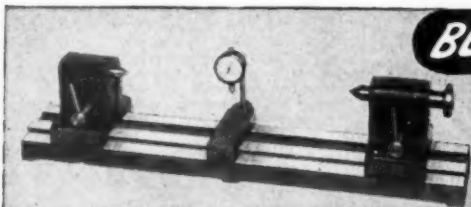
### SAFETY HOLLOW SET SCREWS

*Try Them On Your Next Job!*

### ECONOMY MACHINE PRODUCTS COMPANY

5207 Lawrence Ave.,

Chicago, Ill.



## BENCH CENTERS

Removable Centers are tool steel, hardened and ground. Equipped with spring-type tail stock. Made in 6 inches diameter, 19 inches between centers.

## MICHIGAN DRILL HEAD CO.

971 E. 8 MILE ROAD  
HAZEL PARK, MICH.

is an alkaline, non-corrosive, non-fuming flux, containing no free fluorides with an effective temperature range of 800° (850 to 1650°). It is said to have a strong and prolonged action on metal oxides and also a powerful capillary action on the molten solder. It can be used with any low melting point brazing alloys or silver solders, for joining both ferrous and non-ferrous metals and alloys. Complete price information and laboratory and production test reports are included in the bulletin; also, 20 other welding and brazing fluxes in the Superior line are listed.

#### BROOKS WRENCH HOLDERS

Mechanics using hollow head screws, who have to hunt constantly for the proper wrenches, will welcome this convenient new set of Brooks Wrench Holders.

Each holder accommodates four progressive sizes of wrenches for Allen and, in fact, for all makes of hollow head socket screws. Four holders will cover all screws from No. 4 to 1½". Wrenches can be changed in the holder to use the short or long ends of the wrenches.



Advantages are:—(1) The holders keep a complete set of wrenches ready for use, as there is a particular slot for each size of wrench; (2) The wrench is easier to use when held in this handle-shaped holder; (3) Inclusion of four wrenches of progressive size in one holder makes selection of the proper size to fit a socket easier and speedier.

This tool has just been patented by Walter C. Brooks and is sold by The Micro Tool Co., 8 Sigourney St., Hartford, 5, Conn.

#### FLEXIBLE SHAFT CONTROLS

A new book 449, on Stow Flexible Shaft Remote Valve Operating Gear has been issued by Stow Mfg. Co., Binghamton, N. Y.

Included are improved Flexible Shaft Assemblies and advanced engineering in-

## Empire LIVE CENTER

With Interchangeable Points

ACCURATE • VERSATILE • HEAVY DUTY

THE TAPERED  
SEAT ASSURES  
ACCURACY OF  
± .0001



Empire Toolmaker's  
Set available in  
wooden case—  
each tool in  
its own re-  
cess.

#### Points for Various Operations

- A. Very large, for pipe or tubing work
- B. Extra long point used in facing operations
- C. Extra wide point for large diameter work
- D. Standard point
- E. Blank made of soft tool steel for nests
- F. Female for work not having centers

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Mfd. in all tapers,  
straight shanks,  
and specials.

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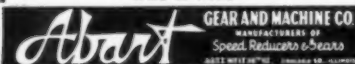


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Precision made. Toughest quality.  
To your specifications only. No stocks.  
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**"ADJUST-ANGLE" KNURL HOLDER**

**Straight  
knurls make  
variety of  
patterns**



By adjusting the angle of the straight knurls, the pattern is varied in numerous styles. Handles work up to 2½" dia. Also available in Passing-over-Stock design. Shank made to fit your turret.

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**TOPS**  
in  
**War  
Production**

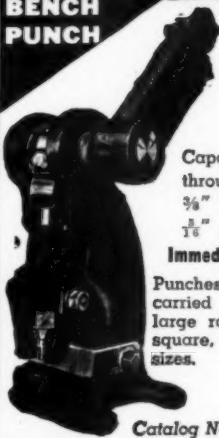


and are available in  
Noiseless Spinning and Vi-  
brating Hammer types. Also  
Vertical and Horizontal  
Multiple Spindle Spinning  
Machines.  
Write for literature and  
don't forget to send samples.

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C E Station, Bridgeport 5, Conn.

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BENCH  
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**STURDY  
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DURABLE  
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HANDY**



Capacity:  $\frac{7}{16}$ " hole  
through  $\frac{1}{4}$ " steel or  
 $\frac{3}{16}$ " hole through  
 $\frac{5}{16}$ " steel.

**Immediate shipment.**

Punches and dies are  
carried in stock in a  
large range of round,  
square, flat, and oval  
sizes.

Catalog No. 8 available

**T. H. LEWTHWAITE MACHINE CO.**  
311 East 47th St. New York 17, N. Y.



formation relating to valve control practice. The book focuses attention on Flexible Shaft Remote Controls suitable for Industrial and Chemical applications as well as for Marine use.

The adaptations described have been selected to convey an idea of the wide

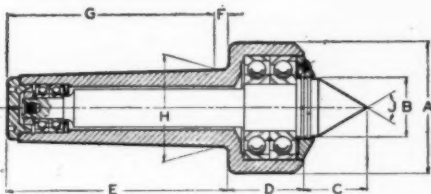
range of service conditions these controls will meet.

In view of the increased use of Flexible Shafting in preference to rigid rods requiring gears, bearing etc., this book will prove of interest to engineers concerned with the remote operation of valves, etc.

### IDEAL 6 MH LIVE CENTER

A "Live" Lathe Center for handling heavy loads up to almost six tons is announced by the Ideal Commutator Dresser Co., 1441 Park Ave., Sycamore, Ill.

Called the No. 6MH, it has a guaranteed tolerance of .0000 to .0005". To handle radial loads up to 5750 lbs. and thrust loads up to 8500 lbs., a special bearing arrangement is used. Two precision ball bearings in tandem support spindle at front; and two angular contact ball bearings pre-loaded, support it at rear of housing. This arrangement also eliminates radial play and possible chatter. For protection against entrance of chips, dust, coolant etc., two sealing rings are used.



A unique feature of design is the ease in redressing the point. Center is simply inserted in lathe tailstock with retainer plug removed. Then a small steel rod is screwed into threaded hole in end of spindle of Live Center. Rotating spindle point with this rod and by using a tool post grinder, accurate redressing of points



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**Tri-Chambered Washer**

A basically improved washer for cleaning metal parts with emulsifying or alkali cleaner. Has heated solvent tank, drain board and two heated rinse tanks. No. 1 water rinse removes most of dirt and oil—so No. 2 water rinse with controlled water flow is not contaminated by oil. Actual production tests prove this arrangement increases rinsing efficiency and reduces power costs. Write today for complete specifications and prices — also for complete Phillips Catalog of engineered metal cleaning equipment for all purposes.

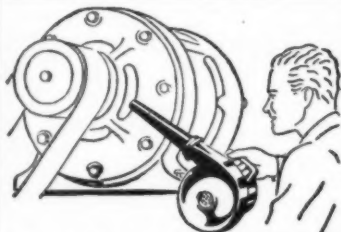
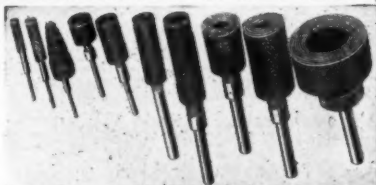
**Phillips Manufacturing Co.** 3443 W. TOUHY AVENUE  
CHICAGO, ILLINOIS

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Designed for precision work where flexibility is required. Indispensable for sanding and finishing . . . penetrating recesses, lapping holes in dies, finishing various shapes of metal, wood, rubber and plastic. Used for finishing propellers in aircraft plants. WRITE FOR DESCRIPTIVE BULLETIN AND SAMPLE. Prompt deliveries.

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BLOW out harmful dust, dirt, lint, etc. with the TORNADO Portable Electric Blower. Prolong motor life. Prevent burnouts. Reduce replacements and fire hazards. Soon saves cost. Investigate.

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PORTABLE ELECTRIC BLOWER

## CARROLL -AND- JAMIESON LATHES 15" AND 16"

12 Speed Geared  
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Spindle.

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Diamonds vary in quality and it is important  
to use the proper kind for a given job.  
"Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer.  
Our 45 years in this field merits your confidence.

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15 MAIDEN LANE, NEW YORK, N. Y.



can be made quickly and efficiently.

Center is made with No. 6 Morse Taper only. Shipping weight is approximately

20 lbs. It supplements the regular line of Ideal Live Centers with Morse Tapers from No. 1 to No. 5.

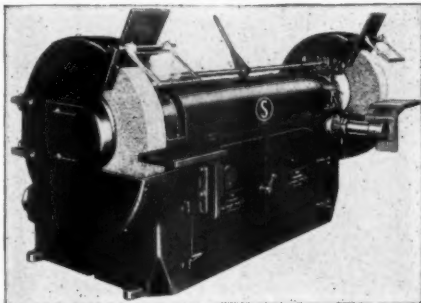
#### FOUR SPEED 30" SNAGGING GRINDER

No. 75 identifies the new heavy duty double end Snagging Grinder produced by The Standard Electrical Tool Co., 2486 River Rd., Cincinnati 4, Ohio.

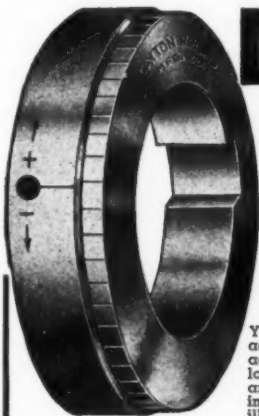
There are four speeds of 1200, 1375, 1675 and 1950 rpm to maintain 9500 sfpm on the two 30x5" resinoid bond wheels. Interlocking speed control prevents overspeeding of the wheels. Power is transmitted thru multiple V-belt drive. A shaft coupling permits convenient renewal of V-belts.

The 30 hp ball bearing motor is adjusted by integral ratchet wrench for placing tension on the V-belt drive. Boiler plate steel guards are conveniently adjusted to wheel wear thru rack and pinion movement by means of built-in ratchet wrench.

Equipment includes adjustable spark breakers, eye shields and heavy duty



work rests measure 6"x11". Wheel flanges are 15" in diameter for 12" bore wheels. Overall spindle length is 92" with spindle height of 33 1/4". The base measures 42"x75". Net weight is 5460 lbs.



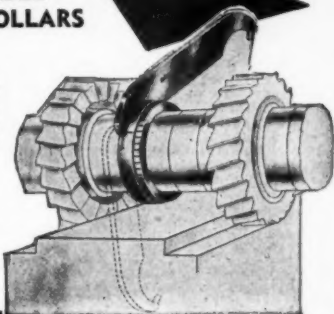
## FAST, ACCURATE SPACING

Graduated in thousandths, you have plus or minus .0005" at your fingertips with

**DAYTON ROGERS  
ADJUSTABLE  
SPACING COLLARS**

You can make an accurate, positive adjustment just by loosening the cutter arbor nut and making adjustment as illustrated.

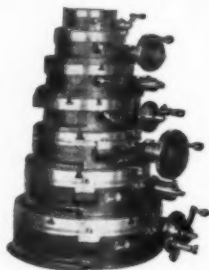
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**SIDE MILLING  
CUTTERS  
GANG MILLING  
SET-UPS**



Made in 12 standards for cutter arbors from 7/8" to 2". Write for illustrated Bulletin 120-7.

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and types for every  
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## for faster Production

LITTELL Automatic Centering Reels are constructed with four arms which operate all at the same time. A free loop of material is supplied to automatic feed, regardless of weight of coil.

Littell Reels are made in 100-lb. to 20,000-lb. capacities. Automatic spindle and cradle types. Plain and motor-driven. Used in thousands of plants for faster production.

Other Littell products include Roll Feeds, Dial Feeds, Magazine Feeds, Air Valves, Straighteners, Scrap Winders, Pres-Vac Safety Feeders, REQUEST BULLETINS.

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## WATER removed from AIRLINES AUTOMATICALLY WITH THE MURPHY SEPARATOR

There is No  
Compressed Air  
Condition So Bad  
in Any Factory  
That We Cannot  
Correct and  
Completely  
Remedy.



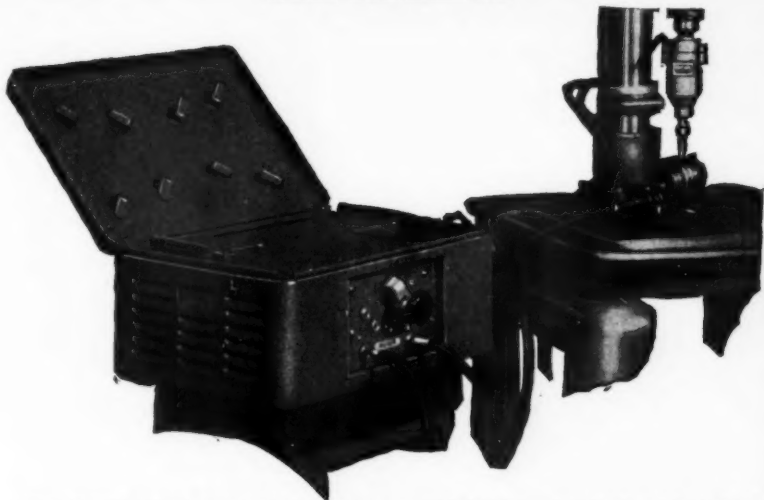
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Literature and Prices on request.

RESULTS — — — GUARANTEED  
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## METAL DISINTEGRATOR



The Drafto metal disintegrator offers an easy and economical method of removing broken taps, drills and studs. It is a compact, portable unit, completely

## ACCURACY MAINTAINED LONGER •

Smith Precision Lapping Plates maintain their accuracy longer because of their exclusive scientific design. Their distinctive large elliptical rib reinforcement with its internal network of spider ribs and supporting ribs to the outer edge of the plate puts strength where it's needed and assures maximum stiffness and rigidity. Then too, Smith Precision Lapping Plates have diamond grooves which hold lapping compound smooth and even and give a fast accurate lap.

Smith Precision Lapping Plates will do your jobs better and faster. Send for complete details today!



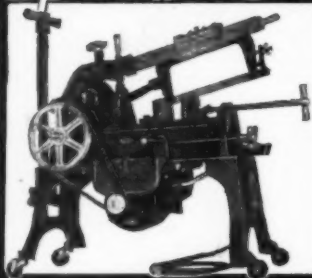
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MASTER SURFACE PLATES • LAPPING PLATES • PLANNER-FINISH PLATES •

## POWER HACK SAW



Low Priced Self-Contained  
**Portable**  
Ready to Work—Economical  
**Sturdy**

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Now . . .  
**A Heavy-duty  
Bench-type Engraving  
and Marking Machine . .  
The PANTO Model UE-3**

- HEAVIER CUTTING SPINDLE
- FOUR SPINDLE SPEEDS
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Plus the exclusive Panto feature . . . Interchangeable heads for engraving, electrical marking, and acid etching.

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157A SUMMIT ST., NEWARK 4, N. J.

## CONVERT

**ANY MOTOR**

into a

*Flexible Shaft  
Machine with an*

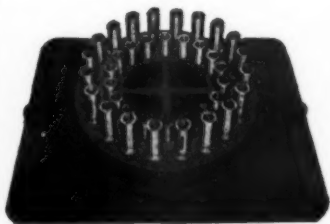
**ELLIOTT UNIT  
DRIVE**



Elliott Unit Drives can be attached to any motor in your plant easily and quickly, and will give you efficient service at low cost. Unit Drives can be applied in hundreds of finishing operations or wherever constant power in a portable tool is needed. Many types of attachments can be used.

Investigate the advantages of the Elliott Unit Drive . . . write for Bulletin 44A giving complete information and prices.

**ELLIOTT MANUFACTURING COMPANY**  
302 HOOVER ST. BIRMINGHAM 4, ALA.



Pictured: a 38-Spindle Heavy-Duty Drill Head.

**DESIGNERS AND  
MANUFACTURERS OF  
MULTIPLE DRILLING EQUIPMENT**

*We invite your inquiry.*

**MICHIGAN DRILL HEAD CO.**  
971 E. 8 MILE ROAD HAZEL PARK, MICH.

self-contained, operates on 110 v, 60 cycle power source. Any metal can be disintegrated by means of a vibrating arc centering directly over the embedded material. A special coolant assists disintegration, helps to cool electrodes, and prevents heat distortion.

According to the makers, there is no possibility of damage to the delicate contours or workpieces.

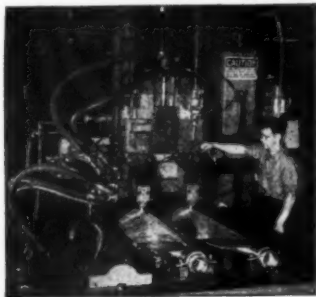
Set-up and operation of the equipment has been simplified so that no instruction period is necessary for the average shop operator. Rate of disintegration varies according to hardness of the metal being extracted and size of embedded work.

The disintegrator head is mounted in a drill press or other device having vertical travel. Work is centered under electrode. The ground cable and arc-coolant tubing are attached and disintegrator is ready to operate. The complete equipment is housed in an 18 gauge steel cabinet, built around a 14 gauge steel plate on which motor, pump, transformer and other parts are solidly bolted.

An attractive 4-page bulletin illustrates and describes the equipment and procedure, and equipment is distributed by Walter J. Greenleaf Co., Penn Bldg., Pittsburgh 21, Pa.

## MACHINING "PROP" BLADES

Turchan Follower Machine Co., 8253 Livernois Ave., Detroit 4, Mich. has developed a method whereby airplane propeller blades can be machined several times faster than formerly thru use of the company's product known as the Turchan Hydraulic Follower Attachment, thereby making it possible to step up wartime production tremendously.



Formerly the machining of the propeller blades was strictly a hand-job—a job

**Will Not Mar  
Metal or Plated  
Finishes —**

### **The New PYRALIN TIPPED MALLET**

**The SOUTHWEST  
MALLET—**a necessity in every tool chest.

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The only Pyralin Mallet on the market with threaded tips replaceable by hand. Plastic tips are quickly and easily screwed into the solid "non-sparking, non-magnetic alloy heads" when replacements become necessary.

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**SOUTHWEST MFG. CO.**

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P. O. BOX 776**

**SANTA ANA, CALIF.**

similar to large and complex die sinking, involving three slow and tedious operations—milling, rough grinding, and hand finishing.

Turchan has converted the process into a simple machine job of duplicating the blade contours with a planer—performing the operation in 1/20th the time.

Using a model as a guide, the Turchan attachment is shown, planing the irregu-

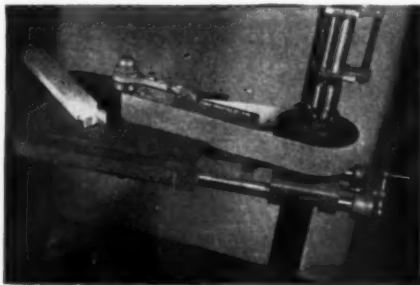
lar contours on a forged member of a 2-piece brazed propeller blade, finishing it to close limits. On this operation, the tolerance requirements are within .008" per inch measured transversely against a master template from a cut made in 4340 SAE steel at a speed of 40 feet per minute. On other similar operations, such as planing turbine blades and cams of irregular shapes, tolerances may be held even lower.

### STUART "ABRAZOR"

Of considerable interest to tool, die and pattern makers as well as others who work in metal, wood, glass or plastics is the Stuart "Abrazor", a precision belt grinder for small radii work.

Recently developed by Stuart Industries, Inc., 75 Bellevue St., Newton 58, Mass., it is pointed out that the grinder is especially suitable for cutting, finishing, polishing and shaping ferrous and non-ferrous materials. It is easily attached to any drill press and permits easy handling of many jobs which would otherwise be difficult.

An attractive 4-page bulletin contains interesting illustrations and



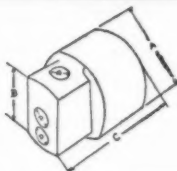
### MEYER Precision Boring Head

- No. 15—6" Capacity with one shank furnished, (Shanks 3 or 4 Morse, 9 or 10 B. & S. or 1" Straight). Price **\$42.00**  
 No. 20—10" Capacity with one shank furnished, Shanks 4 or 5 Morse, 9, 10, or 11, B. & S. or 1 1/2" Straight). Price **\$65.00**  
 No. 25—15" Capacity with one shank furnished, (Shanks 5 or 6, Morse, 11 or 12 B. & S. or 2" Straight). Price **\$85.00**

All Shanks tapped for drawbar unless otherwise specified.

#### DIMENSIONS IN INCHES

No.	A	B	C	D
15	2 1/4	2	2 3/4	1 1/2
20	3 1/2	2 3/4	3 3/4	3/4
25	4 1/2	3 3/4	3 1/2	3/4



Be sure and specify size and type of Shank. One gib, perfect adjustment in thousandths. All shanks are threaded 1 1/4 x 20 hardened and ground.

**MEYER TOOL & ENGINEERING CO., Saginaw, Michigan**



sketches which show the many kinds of work which can be done with this new

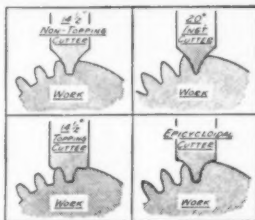
tool. It also gives descriptive information on operation and uses of the "Abrazor".

### TRUFORM FINE PITCH GEAR CUTTERS

The Truform Cutter Co., 3224 Drew St., Los Angeles 41, Cal., offers a stock line of small fine pitch gear cutters that are said to be especially valuable to the laboratory or shop engaged in experimental or small lot production work. These cutters are regularly  $\frac{3}{4}$ " O. D. and have  $\frac{1}{4}$ " arbor holes. The stock line includes 48, 64, 80 and 96 diametral pitches 14½ degree pressure angle, and can be supplied in either carbon or HS Steel. Special cutters in any pitch finer than 48 can be made to order. Also 20 degree instrument type gear cutters and epicycloidal cutters can be supplied in a reasonably short time. Bulletin A-3 gives details.

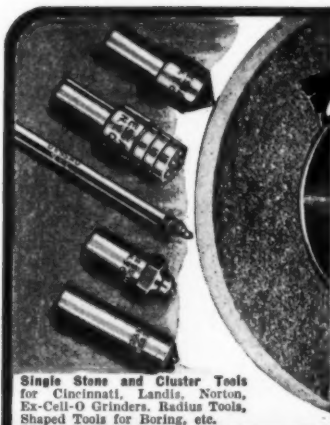
### GUIDE AND SPACING BLOCK

A new Guide and Spacing Block has been developed by Numberall Stamp &



Tool Co., Huguenot Park, Staten Island, N. Y. The device has been designed to assure correct alignment and spacing of characters when stamping details in nameplates.

Nameplate is placed beneath guide. Rotary Stamp is inserted in slot of guide and moved along with each character guided for stamping on nameplate. The lateral graduations for spacing which assures correct alignment and spacing.



Single Stone and Cluster Tools for Cincinnati, Landis, Norton, Ex-Cell-O Grinders. Radius Tools, Shaped Tools for Boring, etc.

## Maintain PEAK PRODUCTION with DESSAU DIAMOND TOOLS

Now . . . more than ever . . . there must be no let down in war production!! DESSAU DIAMOND TOOLS are contributing . . . efficiently and economically . . . to industries all over . . . to help them maintain peak production. There's a reason. Every DESSAU DIAMOND is thoroughly examined for hardness, shape and construction before it is set into your specific type of tool. Where precision counts . . . you can be sure with DESSAU.

Write Dept. B  
for newest catalogs  
and price lists.



**MAURICE S. DESSAU CO.**

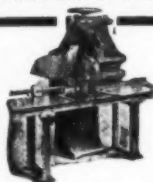
INDUSTRIAL DIAMONDS • DIAMOND TOOLS

535 FIFTH AVE. • Telephone: RA 4-0600 • NEW YORK, N. Y.  
"Dessau Diamonds True the Wheels of Industry"

## OLIVER No. 94-D CUT-OFF SAW

*cuts mouldings, tubes, strips of  
metal and compositions . . . .  
and accurate to .005 inch*

**SAVES  
TIME,  
SAVES  
SPACE,**



**AND  
SAVES  
YOU  
MONEY**

A mighty efficient production saw that makes straight or angle cuts of tubes and strips of metal, hard rubber or compositions. Self-contained, very compact. Operates lightly with no rebound. Well safeguarded. Cuts hundreds of pieces without variation of .005 inch. Ball bearings for long service and smooth operation.

**Write for Illustrated Bulletin**

**OLIVER MACHINERY COMPANY  
GRAND RAPIDS 2, MICHIGAN**



Blocks are available for various sizes of characters and nameplates from 1" to 4" L. and 1" to 6" L. and are made of hardened steel.

### RESISTANCE WELDING CONTROL

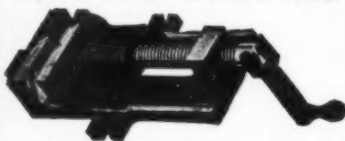
Designed to set forth in a clear and understandable manner how welding processes differ, how electronic control for resistance welding works, and how this method of control extensively adapts this welding process to industry, a new seven-part training course by slide sound films, lesson books, quiz book, and an instructors manual has been prepared by Westinghouse.

Altho produced primarily for Westinghouse employees, the material has been made available to others at reproduction costs because of many requests from engineering groups and individuals interested in resistance welding control.

It is recommended that eight to 10 hours should be allowed for the full seven-part course, two hours for each of the four lessons. Lesson I to cover Parts One and Two, Lesson II to cover Parts Three, Four and Five, Lesson III to cover Part Six, Lesson IV for Part Seven and Quiz; with classes held one night each week, thus giving class members a chance for review and supplemental reading. Subjects covered by the course include:

Part One—Basic Definitions of Welding Technology:—Forge Welding; Gas Welding; Thermit Welding; Electric Arc Welding; Resistance Welding.  
Part Two—Types of Resistance Welding Work:—Spot; Projection; Seam; Butt; Flash; Duty Cycle.

## YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

**Offered in two sizes.**

Vise No.	Width of Jaw, inches	Open inches	Weight Pounds
1B	3 1/2	3 1/2	12 1/2
2B	5	5 1/2	23

**Do you need a vise of ANY type?**

**Write today for bulletins on  
the extensive Yost line**

**YOST MFG. COMPANY  
1335 SO. MAIN ST.  
MEADVILLE, PENNSYLVANIA**

**Part Three—The Ignitron and Thyatron:**  
—Fundamentals of Electronic Tubes; Ignitron; Thyatron.

**Part Four—How the Flow of Resistance Welding Current is Started and Stopped.**

**Part Five—How the Amount of Resistance Welding Current is Controlled:**  
Phase Shift Heat Control.

**Part Six—Electronic Timing Controls in Resistance Welding:**—Basic Principles of Electronic Timing; Synchronous-Precision Weld Timer; Nonsynchronous Timer; Sequence-Weld Timer.

**Part Seven—Energy-Storage Control:**—Capacitor Discharge Type; Magnetic Type.

Slide films and records for the seven lessons give clear, visual explanations of the basic theory and applications. (For use with 35 mm sound slide film equipment). Seven lessons in handy pocket size, reproducing the subject matter of each lesson, are provided each member of the class. These afford a convenient means of review and supplemental study. One quiz book is supplied each member of the class for final review of subjects covered. An instructor's manual giving suggested classroom procedure is provided

ed with complete course. Informative booklets on resistance welding in industry supplement course material.

For a class of 20 a complete set of material costs \$50.00 and includes:—20-sets—Seven lesson booklets and Quiz book. 20-sets — Supplemental literature. 1-set — Seven slide films and records. 1-each—Instructors manual.

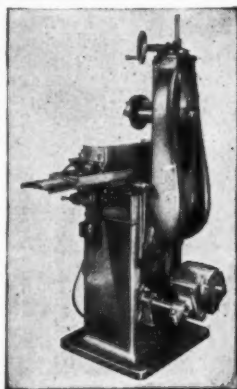
Orders for the resistance welding control training course should be sent to Mr. C. R. Riker, Supervisor, Extension Training, Westinghouse Electric & Mfg. Co., 306 Fourth Ave., Room 1712 Pittsburgh, Pa.

## JACK LOCKING CAM

By ALEX. S. ARNOTT

An interesting method of employing cams involves the jack cam shown in the sketch. This cam is very simple to make and may be placed in any position. It is easy to operate and provides excellent clamping power. The best feature is that it may be adjusted thru the slot (a).

The general features are that the assembled cam is made up of three pieces.



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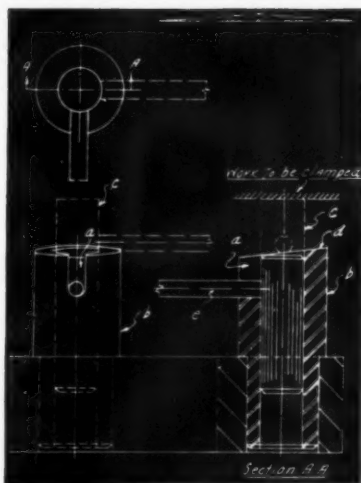
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The body (b) is made of good quality steel and bored a snug fit for the clamping bar (c). A shoulder is turned to facilitate pressing the body into the jig plate. The angle (d) should not be more than 3-degrees. The slot may be cut over-size sufficiently to accommodate the handle (e) which is pressed into the clamping pad (c). To operate the clamp, the handle is moved up until it reaches the level of the wedge. Then it is turned either left or right to climb up the incline, clamping the clamping pad against



the work, holding it firmly. As stated before, the angle must not be more than 3-degrees or the clamp may work itself loose and release the work during the operation.

The dotted lines shown on the section view "A-A" represent position of the clamp against the work in the locked position. The full lines indicate the clamp in a resting position. Construction of the clamp details in their relative positions are also shown.

#### EVOLUTION OF A FEED CHUTE

By H. F. WILLIAMS

The feeding of short cylindrical slugs made of steel from an overhead storage

Essential to the efficient diamond wheel  
grinding of Tungsten and Tantalum  
Carbides

## CARBOIL

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CARBOIL solves the problem of diamond wheel glazing and loading, which lowers cutting efficiency and may cause irreparable damage to wheels and tools.

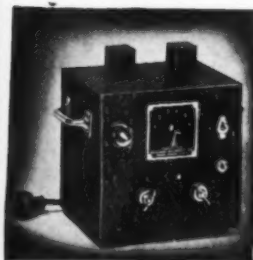
CARBOIL lubricates, cleans and prevents foreign matter from accumulating on diamond wheels.

Under microscopic scrutiny it will show a superior tool finish. It provides a better cutting action, requiring less pressure against wheel.

It adds to the life of tungsten carbide tools by keeping them cool during grinding, preventing internal carbide strains which may cause subsequent tool failure.

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**CARBIDE TOOL ENGINEERING CO.**  
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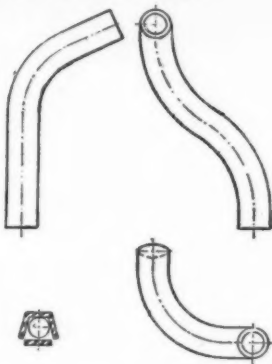
A sturdy all around unit for any shop. Demagnetizes by throwing lower switch and passing work over magnetic poles at top of unit. Etching is controlled at upper switch with convenient six station selector to adjust depth of etch. Red indicator light signals when unit is in operation. Rubber extension cord, plug, special alloy etching stylus with self cooling holder are included. Write for folder giving details.

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bin or hopper to the operational position in an automatic machine caused some consternation in its design.



The chute was first made of built-up channel, fashioned in the welding shop as shown in the upper right-hand corner of the accompanying sketch. The retainer

strip above the channel was required so the pieces would stay in the chute. This U-shaped channel, made of mild steel would constantly wear large so that the pieces received a tumbling, thereby causing improper feeding to the machine.

Because of the compound bends in the chute as illustrated in the three views, it was hard to shape the piece and required too much fabricating time. The upper guide caused the same objection. Even though various types of lubricant were used from light oil to fairly stiff grease, the wear continued.

A hard brass tube was then formed to the required shape but the grease was pushed out by the continual feeding of the slugs. Friction then became too great to feed the pieces properly even tho there was some weight because of the column being fed. After several trials with both brass and steel tubing, flexible metallic tubes were tried having concentric and helical convolutions. The solid or bellows type of flexible tube seemed to work the best because the grooves not in contact with the slugs were packed with grease which was not pushed out so rapidly as in a solid smooth walled tube.



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Then too, the path on which the pieces slid was a series of rounded ridges that gave a free sliding movement. But because the maintenance of a grease supply was neglected this flexible tube also wore out, probably because the metal of which the tube was made was necessarily thin so as to form the convolutions.

However some success had been obtained by the observation that a grease pocketed and corrugated surface was definitely the right type of feeding chute. It was decided that some form of heat treated tube of the preceding specifications might solve the problem. Because the flexible tube assumed a natural position for a down and around direction, it was decided to use a helical spring.

A spring was wound of the tension type but having plain ends ground square with the axis. It was wound with very little clearance between the coils and was made of generous diameter of soft spring steel wire. It was twisted and set to the required shape and thereafter heat treated. It was packed with grease inside, between coils. Because the steel could be hardened beyond that required for the usual elasticity in a spring, wear was overcome almost completely. The rounded top surfaces contacting the slugs were only shined up after a considerable period of time and surprisingly enough, the greasing lasted for some time.

## ELGIN "DESK" TYPE LATHE

An improved "desk" type bench lathe has been developed by Elgin Tool Works, 1770 Berteau Ave., Chicago, 13. Designed for tool room and precision shop work, the new unit offers greater versatility and maximum operating convenience.

The lathe itself is a standard Elgin precision bench type with a 1" collet capacity, 9" swing and maximum capacity between centers of 17".



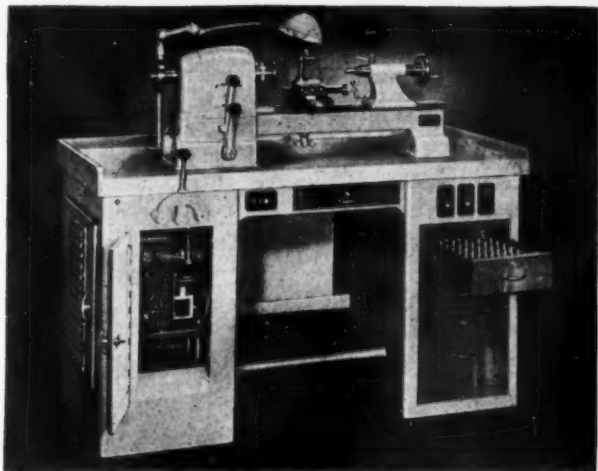
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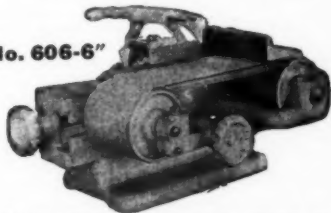
The base mounting is sturdy and affords generous leg room and has a foot rest for operator when seated. Ample

drawer space for storage has also been provided.

The top drawer, to the right, is fitted

## PEERLESS BENCH SURFACER

No. 606-6"



The No. 606-6" is designed for cleaning and finishing castings, dies, stampings and any other work up to 6" wide that can be ground. Gives a straight line finish, leaves sharp edges, and eliminates hand labor.

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RANGE OF DIAMETERS: FROM  $\frac{1}{4}$ " TO 7" ON EXTERNAL GEARS, FROM  $\frac{1}{2}$ " TO 6" ON INTERNAL GEARS; FACE WIDTH FROM  $\frac{1}{16}$ " TO 2"; PITCH RANGES FROM 6 TO 240 PITCH.

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for holding collets. The bottom drawer, which is  $9\frac{1}{2}$ " deep, provides storage space for the faceplate, three and four jaw chucks, drill chucks, etc. Two other drawers provide additional storage space. All the drawers are fitted with locks.

The base is of  $\frac{1}{4}$ " steel construction and has a laminated hard maple wood top.

The motor is completely enclosed and requires no additional guards.

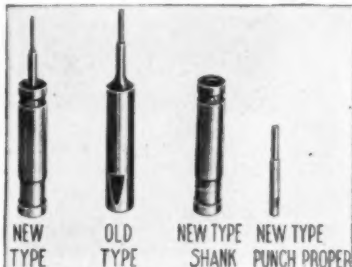
The range of the variable speed drive has been expanded upward as well as downward so that stepless spindle speeds ranging from 40 to 4000 rpm are available. The lower speeds of this drive can be used to advantage for grinding operations. A solenoid operated clutch with push button control provides means for obtaining a free turning spindle to facilitate truing up or setting the work. The lathe can be quickly put into operation simply by connecting it with the electric power line.

Current for the 32-volt machine line or current of any other voltage desired may be taken from the main circuit thru a transformer.

### TWO PART UNIVERSAL PUNCH

At the left in the illustration are shown the old type universal punch and the new type which now is in use at the Sunbury plant of the Westinghouse Electric &

Mfg. Co. At the right are shown the two parts of the new punch—the shank and the punch proper.



The old type punch was turned and ground from one piece of tool steel and then hardened. When the end of the punch became worn or broken the whole tool had to be scrapped because it was made in one piece.

The shank of the new type punch is turned bored and fitted with a set screw to hold the punch proper. One end of the punch proper is turned and ground to

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the hole size, and the other end is turned and ground to suit the shank. The shank end of the punch proper has a flat ground on it so that the set screw will hold it in position.

When a punch is broken or worn out now, it is necessary to replace only the punch proper; this saves the time and material involved in making the shank.

#### COLORED GAGE HANDLES

Aluminum handles are now being manufactured by American Gagemakers Supply Co., 11706 Woodward Ave., Detroit 3, in black, yellow, bright red, maroon, green, light, medium and sapphire blue, as well as violet.

These handles are manufactured to the specifications of American Gage Design Standards, the sizes ranging from No. 000 to No. 7.

These colors are formed by absorbing a proper amount of dye into the anodic coating, formed under properly controlled conditions and sealing the solution which prevents the color from being bleached out by water, either hot or cold. There is also a protective coating put on the handles to protect the wearing surfaces.

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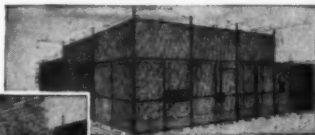


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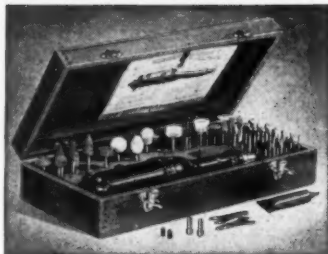
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## THE PRECISE 35

### MACHINE INSTALLATION

Whether it be a small shop, where arrival and installation of a new machine is an outstanding event, or whether it be a large plant where this is a frequent occurrence, the proper installation of new units is a matter that may affect the profit sheet quite decisively, in either direction.

If the machine is of a type that will cause a considerable amount of vibration, it may be well to install it on a foundation of cork, felt or some other material that will isolate it from the building floor, there being materials available for this purpose.

If, on the other hand, it be a delicate machine or mechanism, which vibrations from other machines might seriously affect, this is also a sufficient reason for installing it on a foundation that will tend to insulate it.

Again, if it be a very noisy unit in operation, it will be worth while remembering that fatigue is caused by excessive noise, and it may be well to put it in a removed location, or to provide it with noise-silencing hoods, such as are installed by certain engineers.

In cases where machines are lifted by a hoist for installation, and spotted with a bridge crane for lowering at the location they are to occupy, care must be taken to arrange any slings or hooks used, in such manner that the unit will not be damaged.

Some machine manufacturers have provided staunch lifting eyes on their units,

placed at points calculated to throw no damaging strain on the equipment.

In some cases, where standard shapers are being installed, a sling is placed around the column under the ram, at front and back, so that it bears closely against the column, and not against the scraped bearings of the ram.

One shaper manufacturer points out that a rope sling, never a chain or cable should be used for this purpose. Rope diameter should be adequate for the weight, and recommendations can be obtained either from the manufacturer of the machine, or of the sling.

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Pittsburgh Corning Corp., has announced plans to double the capacity of its Foamglas plant at Port Allegany, Pa., to meet rapidly increasing demands for cellular glass insulation, an entirely new material first put into commercial production less than two years ago.

Foamglas, so far produced in rigid slabs 12x18" and in various thicknesses, is a true glass which has been blown up or "cellulated" so that its volume is about 15 times that of ordinary glass.

It has a closed-cell structure, there being some five million tiny sealed air

pockets per cubic foot. It weighs 10 pounds per cubic foot, about the same as cork.

Because it is so light and completely impervious to water, it has found wartime use as the buoyant element in life rafts, net buoys and similar heavy floatation equipment. As insulation it has been used in many types of ship construction.

Foamglas is unique in that it is completely and permanently unaffected by water in any form. This property insures that the thermal insulation provided by its light weight and cellular structure will not lose its effectiveness regardless of time and service conditions.

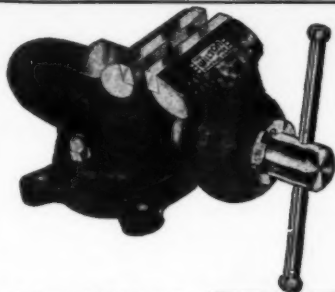
It is non-combustible and acts as a fire retardant when used in conjunction with other materials which are not fire-resistant. It is vermin and rodent proof, and will not absorb or give off odors.

Being glass, the product is not harmed by acid atmospheres or solu-

tions which attack many materials. Hydrofluoric acid and hot caustic are the only chemicals which affect it adversely.

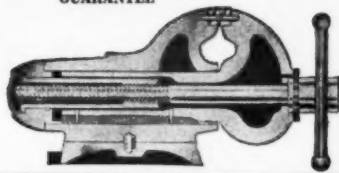
In addition to its strictly war tasks, Foamglas has found duty as thermal insulation in hot and cold tanks and towers, outdoor vats, furnaces, gas flues and ducts, drying kilns, process rooms, cold storage spaces, exterior built-up roofs, building floors and in cavity or core wall construction.

The first step in making Foamglas is to melt a special and exact mixture of raw batch materials at 2800° F. This molten glass is drawn from a furnace.



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2"	2 1/4"
3"	4 1/4"
3" H.D.	4 1/4"
4"	5 1/4"
4" H.D.	5"
4 1/2"	5 1/4"
4 1/2" H.D.	8 1/4"
5"	8 1/4"
6"	9 1/4"

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Approximate Weight	Price with Sveist*
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30 lbs.	15.80
37 lbs.	18.60
47 lbs.	21.00
39 lbs.	21.30
55 lbs.	27.50
58 lbs.	33.60
106 lbs.	62.00

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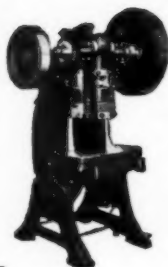
★ Here is one of six Federal Presses in operation at the Wadsworth Watch Case Co., forming tiny bearing parts. "These operations are of a most exacting nature," says Wadsworth, "and demand that work be held at very close tolerances." An example of Federal Press accuracy—typical of many other specialized jobs these versatile presses are performing in hundreds of plants today. Write for latest catalog.

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## A BILLION STRESSES

Impatient with endurance test methods that require five or six years, engineers at the Research Laboratories of Westinghouse Electric & Mfg. Co. have devised test machines to check the new high temperature alloys used in steam turbines, jet propulsion units, and other high temperature machines.

At room temperature, the story of endurance of a metal is usually told in 10 million cycles of stress. But, at elevated temperatures, the curve of waning endurance continues downward for several hundred million cycles. By ordinary

means, it takes years to stress an alloy sample held at say 1500 degrees F a quarter of a billion times.

The special machines can do this testing job in a month. The test piece is clamped in a furnace that maintains the desired temperature.

Thru the clamping structure is applied a stress 120 times per second by two stator coils connected to a two-phase 60-cycle supply line. The entire system is mechanically tuned to resonance at this frequency to minimize the driving force necessary.

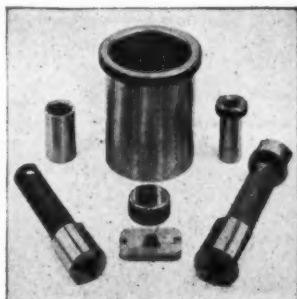
This tuning also serves another highly desirable purpose. Research engineers want to see the specimen after the first tiny crack occurs, not after the complete failure of the sample.

With this device, the first crack reduces the stiffness of the system, which detunes the mechanism to such an extent that the machine automatically stops.

Thus a sample can be placed in the tester, heated to the desired temperature and the test started and allowed to run day and night without attention for weeks or months until failure just begins.

After this the test stops itself without continuing until important evidence of the mechanism of failure is destroyed. Tests of high-temperature alloys up to a billion applications of stress have been made in 100 days.

Research of this type gives a sound engineering basis for subsequent designs and operations. Guess work and uncertainty are eliminated. There is definite assurance as to performance.



**T**HE manufacture of Drill Jig Bushings and the manufacture of Gages are so closely related that Economy Tool has found it most practical to specialize in the production of both.

This kind of a set-up also enables us to manufacture various other hardened and ground precision parts, including Centerless Grinding and Super-finishing, in limited quantities.

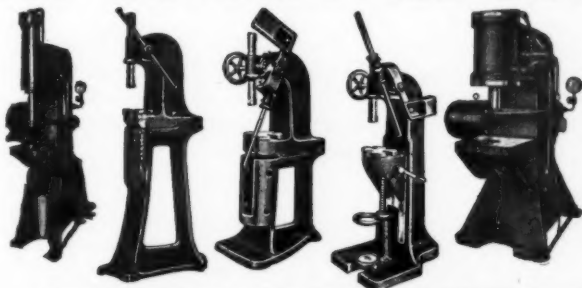
Experience through the years tells us that your job can be no better than the tools applied in the making. Your production standards are high for a reason. Nothing will suffice unless it meets specifications exactly as you prescribe them.

Precision, therefore, has become a law to us. Tools are made to keep you at top production with minimum cost.

*Write today for particulars*

**ECONOMY TOOL & MACHINE CO. MILWAUKEE 14, WIS.**

## For AIRCRAFT and MUNITIONS



**1883  
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The Originators  
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65 Standard Styles and Sizes. Manually operated presses  $\frac{1}{4}$  to 35 tons pressure.  
Motor driven hydraulic presses  $1\frac{1}{2}$  to 30 tons pressure.

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NEW HAMPSHIRE



## McMAHON'S Magnetic Blocks

### V-100 Magnetic Block

30-45-60° Angle, with Brass Separators, Brazed in place.  
Size  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " x  $3\frac{1}{2}$ " long. Priced \$35.00 each.

### K-125 Magnetic Parallels

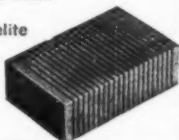
Sold in Sets of Two Blocks, with Bakelite Separators. Size,  $1-3/32$ " x  $2\frac{1}{4}$ " x 4" long. Price, \$12.00 per Set.

Write for Descriptive Literature.

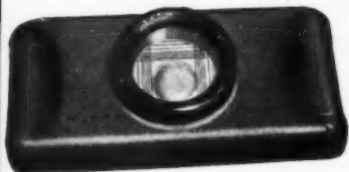
**FRANK McMAHON COMPANY**

142 S. JUNE ST.

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## FELL PRECISION LEVEL

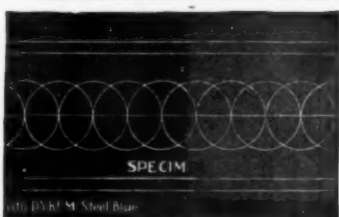


A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005" per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes— $5\frac{1}{2}$ " x 12";  $3\frac{1}{2}$ " x 6".

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Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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Use artificial or natural gas or gasoline. Start without generating—"soldering heat in less than a minute." Schmidt "CONCEALED FLAME" Soldering Torches hold coppers steadily at any desired heat for continuous work. Very economical.

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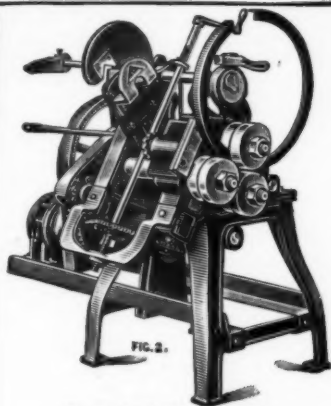
for all Soldering  
Open Flame Work  
Brazing  
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**CONCEALED  
FLAME  
TORCH**



**OPEN  
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TORCH**





No. 14 Angle Rolling Machine

ROLLS ANGLES, TEE IRON, PIPE,  
FLATS, ROUNDS AND SQUARES  
CAPACITY—2"x2"x¼" ANGLE

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HERE IS A  
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Our Desmond  
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Cutters are  
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sizes.



We manufacture only complete line of dressers and cutters on the market, and will be glad to send samples for trial. Write for copy of our new catalog and name of your nearest jobber.

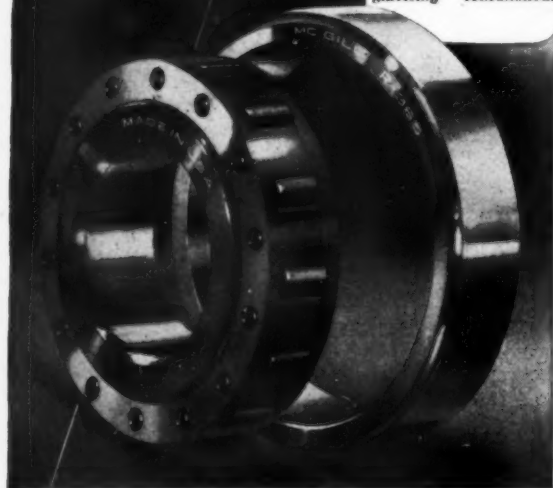


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**McGILL MANUFACTURING CO., INC.**  
Manufacturers of Ball and Roller Bearings  
VALPARAISO, INDIANA

## TACHOMETERS

Many shops where different machines and equipment are in process of building, find it necessary to test out rotary speeds obtained. Also, there are many shops where it is necessary, from time to time, to make the same sort of test on machines used in the processes of manufacture.

Consequently, there is a wide demand for suitable tachometers thruout the metal-working industries. The particular kind of instrument used depends largely on existing conditions around a given factory.

One specific type can be used in any

machine shaft being checked. In this last case, a length of cord varying anywhere from the 5' length mentioned, all the way up to several hundred feet, may be used.

Did you ever encounter a tachometer which would measure rates of vibration as well as speed, and would do it simply by being held against or mounted on a machine?

You can measure the speed of a rotating element without even being able to see it in some cases. This type of instrument is known as the vibrating-reed tachometer. It is noteworthy also because it never requires any lubrication.

one of three different ways. This particular instrument is of electric type. The principle on which it operates is simple. The revolving shaft which is to be tested for rpm, is made to drive a small electric generator, which is an integral part of the tachometer. This generator is simply coupled electrically to an electric meter. Since the meter reading will vary as the speed of the generator, it allows a direct speed reading to be taken.

This device is used with the generator and meter coupled together rigidly, with a precision-made bayonet lock. Another way is to have the generator and meter separated, and connected with a 5' length cord and coupling. In these two cases, the entire instrument is portable.

The third manner of using it is to mount the meter on an instrument board, while only the generator is applied to the machine



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Be Accurate  
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**DRILL JIG BUSHINGS**

There's no guesswork when your jigs are equipped with Acme Bushings. On the contrary, accurate drilling is assured, because drill jig bushings from Acme are produced by specialists in precision manufacture.

Acme offers two complete bushing standards, the A.S.A., plus the Acme standard line. Because of this you may be enabled to eliminate many special bushing requirements to save time and money.

You are invited to write for details on Acme's complete line of products and services offered to the precision working field.



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*Makers of Standardized Jig and Fixture Bushings*

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6" x 1" wheels. **\$95.00**

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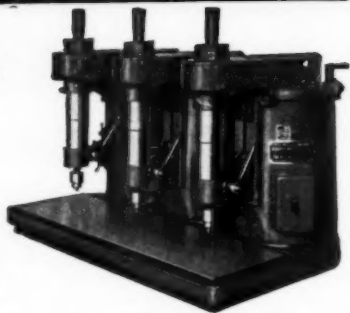


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# SIGOURNEY M-100

## SINGLE OR MULTIPLE SPINDLE DRILLING MACHINES



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*Sole Sales Agents*

**PRATT & WHITNEY**

Division Niles-Bement-Pond Co.

West Hartford, Connecticut

### HURRY-UP JOB

It was before the first big B-29 raid on Japan—and the brass hats were yelling for hundreds more of the Superfortresses.

All over the country engineers were wrestling with problems involved in getting the new plane into mass production. In the General Electric plant at Bridgeport, Conn., for instance, they were trying to find a way to turn out certain intricate parts fast enough to keep up with production schedules.

On one particular item, a part of the fire-control mechanism, they were having especial trouble. The machine they had

think I can lick this thing," he said. But the engineers were too wrapped up in their own calculations. They couldn't stop now, they said, to try things that hadn't even been set down on paper.

But the idea wouldn't leave Duke's head, and the engineers finally gave in.

Duke spent just four hours tinkering with his machine. What he did was so simple that the experts hadn't even dreamed of it. He merely ran it forward and backward, then forward again. That simple operation made the machine correct its own errors, made mass production possible.

tooled up to make the part was too slow. Unless a faster way could be found, all-out bombing of Japan by the B-29's would have to be drastically postponed.

Months went by and the engineers wracked their brains, while Washington bombarded them with hurry-up calls. Duke Ericson, out in the shops, did some brain-wracking, too, though that wasn't supposed to be his job. Duke—full name Orvar Nils Ericson—is a soft-spoken man of 41, with the expressive fingers of a master craftsman. He is not an engineer, never even went to high school; but when you have been a toolmaker more than 20 years, you take it personally when your machine turns stubborn on you.

Then, one day, as told by James B. McLean in "This Week", Duke approached the engineers. "I

## No. 2 To No. 6

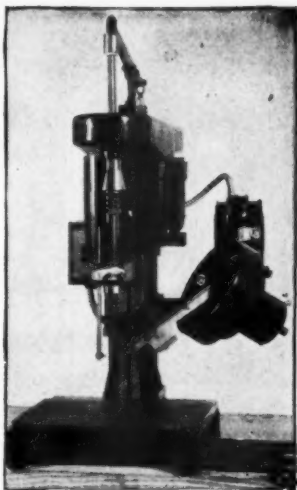
Screws Driven on this Husky but Sensitive Hopper Feed Screw-driver.

No handling of screws. Just place assembly on table, move from screw hole to screw hole. The machine does the rest.

Drives screws at one second each.

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SAVE TIME ON INTRICATE **ANGULAR SET-UPS . . .**

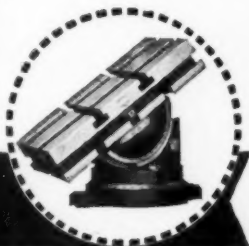
## MULTI-SWIVEL VISE



Fully universal . . . three swivels simplify the setting of compound angles. Parts interchangeable . . . can be used as a plain flanged vise, a swivel vise or multi-swivel vise.

*The Platen greatly increases the capacity of the unit. Vise and Platen are interchangeable.*

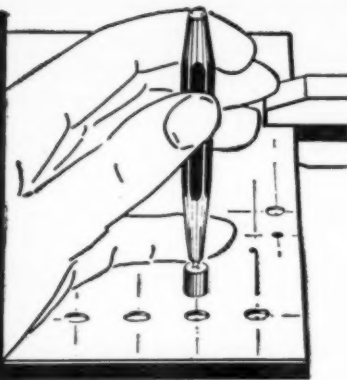
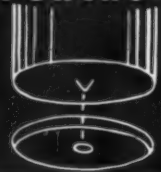
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# Allen Template Transfer Punches



**Locate and Center INSTANTLY**

● THESE punches incorporate a number of definite advantages, i.e., (1) The points are concentric with the bodies which are accurate to size within .0004"; (2) a full range of sizes may be stocked at low cost; (3) replacements are readily available, at much less cost than punches made in user's own plant; (4) designed for use with a universal holder, they are only a fraction of the size and weight of solid punches, occupy small space; (5) the octagonal holder also takes a scriber, prick punch, etc., is of comfortable size and weight, cannot roll.

Interchangeable type Allen Template Transfer Punches are made in diameters from .040" to .375". Heavy duty and solid types, from 1/8" to 5/8". Special sizes and types on order. One aircraft plant alone has purchased more than 150,000 of these punches. Write today.



**H. D. ALLEN**  
MANUFACTURER  
3201 CASITAS AVENUE  
LOS ANGELES 26, CALIFORNIA

## DIE HANDLING

Dies, especially when very large and heavy, are difficult to handle, whether they are being handled while in process of making, or to and from storage and the various presses in which they are used.

Consequently, special handling arrangements have been developed in many different metal-working shops.

In one instance, where dies were quite commonly machined on a certain milling machine, a spur monorail track was run out over the milling machine table. Heavy die blocks could be readily lifted with a chain falls suspended from a trolley on

the monorail, pushed to position over the machine table, and lowered upon it.

When you have really large dies, you need very powerful handling equipment. In one particular case, a special die-handling lift truck with a capacity for handling six tons, was built and equipped with a heavy duty double-drum die handling winch. The winch had a remote control, so it could be handled by operator at the back end of the truck. It had a heavy tiering platform with a variable lift, for handling dies to required heights both at presses and storage.

This platform had a head roller, and was provided with sheaves in such manner that heavy dies could be pulled onto and off the platform by power. Economical handling and moving of dies between storage and press room is a simple matter with such trucks.

Similar trucks, with somewhat less capacity, have been used by other firms for the same purpose. One has a capacity of five tons. It is fitted with special roller bushings, which assure quiet and trouble-free operation.

Portable elevators are pressed into service for lifting dies of smaller sizes, to put them into presses or on storage racks. There are certain portable elevators for this particular job. Some have capacities as small as 500 lbs. and from that on up to 5,000 pound capacity, machines are available. This makes a one-man job of handling dies, in shops where it was necessary for help to be obtained.

Presenting the Famous

# MEAD AIR CLAMP

Wherever a drill comes down, something must hold the work. Wherever a drilling-jig is required, *Air-Clamp* will simplify it.

Wherever speed is desired, *Air-Clamp* will produce it. *Air-Clamp* holds with relentless pressure; it is undisturbed by size variations (such as in casting), it scoffs at vibration (how many drills have been broken due to faulty hold-downs?), chatter, snagging. *Air-Clamp* holds work of any size or shape in any position, at any angle. Can pay for itself on a single fixture; saves its cost on a few days' drill-press output. Reduces operator fatigue. Saves hours and dollars in drafting-room, jig department, tool room and production line. *Air-Clamp* fits any drill-press having a cylindrical column. Special fixtures for Tee-slotted tables, light milling work, etc. Hand and/or foot control. Shipped on approval to responsible concerns.

Write for new Air Power Catalog.

## MEAD SPECIALTIES COMPANY

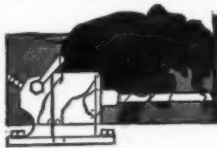
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For  
Greater  
Drill Press  
Output

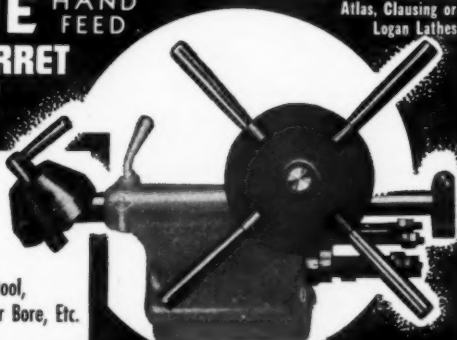
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# for *SPEED* and *EFFICIENCY* USE **UNIQUE** HAND FEED **TAIL STOCK TURRET ATTACHMENT**

For 9-inch South Bend,  
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- Can Be Installed In 5 Minutes.
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**SAFETY DRESSER**  
**For HAND GRINDER**

1/2	Carat.....	\$ 9.85
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**LONG HANDLE — SAFETY FEATURE**  
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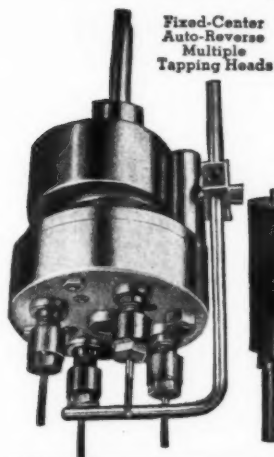
**SOMERSET INDUSTRIAL DIAMOND COMPANY**

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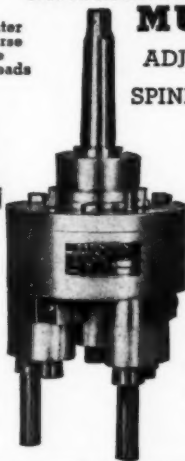
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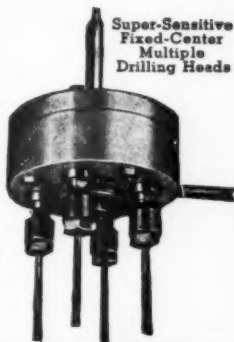


Fixed-Center  
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Multiple  
Tapping Heads



**MULTIPLE HEADS**  
 ADJUSTABLE MULTIPLE  
 SPINDLE DRILLING HEAD

All Parts  
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to Insure  
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Lubrication  
and  
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Support of  
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Spindles



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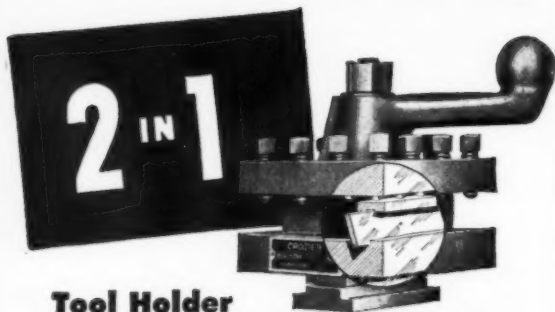
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 ON TIME!**

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## Tool Holder and Cut-off Bit included with the Crozier Tool Post Turret at NO ADDITIONAL CHARGE!

Standard equipment with the accurate, high quality Crozier Tool Post Turret now is a specially designed holder and a high speed steel cut-off bit—at *no extra charge!* Not only is this exclusive feature (Patent Applied For) an immediate money-saver, it also increases production, provides more rigid tool support and reduces set-up time. The Crozier Tool Post Turret, the first to be made for bench lathes, retains its normal advantages of fast, close indexing, dependable accuracy and long life which have made it so popular. It is available for Small, Medium and Big lathes—with cut-off holder and bit *without additional cost, remember.* Write for details.

# Crozier

CROZIER MACHINE TOOL CO., PRAIRIE AT 118th ST., HAWTHORNE, CALIF.

Successors to C-W-C Corporation

### EMERGENCY ACTUATION

Automatic actuation in the event of an emergency is a principle that is being used more and more frequently. We find the principle applied to automatic alarms or signalling devices, mounted on fences surrounding factories.

The equipment is vibration-sensitive. Any attempt to scale the fence, to cut thru it, or to dig under it causes a visible or audible signal to be given.

It is also common knowledge that photoelectric equipment can be made to perform similar duties, wherever it can be arranged so that a beam of light will be intercepted by an intruder. The beam can

be of invisible light rays, in some cases, so that an intruder would not even be aware of its existence. Many firms provide photoelectric equipment, and engineer it to fit all sorts of emergency—actuation needs.

Emergency actuation in case of fire is a subject with which fire-prevention engineers have long been well acquainted. Usually the basis of the actuation is a so-called fusible link, made of some metal having a very low melting point, and designed into equipment in such manner that it will operate automatically if the temperature rises to the point where the fusible link melts.

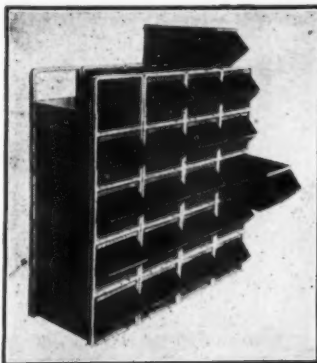
Fire doors are placed on inclined tracks, or hinged in such manner that they will close by gravity, shutting off draft, when a fusible link holding them open melts.

Fusible links in various cases hold mechanisms inoperative against the resistance of

springs, so that as soon as the link melts, the springs expand or contract to close a switch, operate a valve, or produce actuation thru some other means.

Have you ever encountered an impact actuator? This is something relatively new in the emergency actuation field, but it is by no means unimportant, and such actuators are available on the market.

Much used at present on airplanes, if a plane crashes, the impact actuator automatically takes charge of the situation. It releases fire extinguishers, shuts off switches, turns off fuel lines, or does any duty which can be handled thru a switch or a valve.

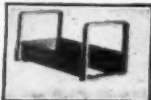


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Because Stackbins are portable containers — not fixtures — tools, parts and materials can be carried to departments, from machine to machine, or held in stockrooms without being transferred from one container to another. Stored in Stackracks, any Stackbin is instantly accessible when its contents are needed — without disturbing any other bin.



**STACKBINS** are individual hopper-fronted stacking bins, designed for storage, transportation and assembly.



**STACKRACKS** are individual units which lock together to form storage racks of any size, shape or capacity, into which Stackbins slide like drawers.

**STACKBINS IN STACKRACKS**

Manufactured and sold in Canada exclusively by  
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Write Stackbin Corp., 55 Troy St., Providence 1, R. I.

# STACKBIN

"Stacked and



# SYSTEM

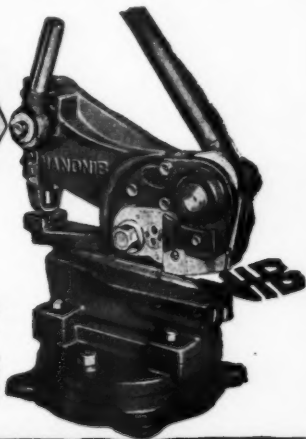
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IRREGULAR SHAPES**

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Capacity: Nibbling and Shearing 3/16" flat stock ...  
Punching Holes up to 1/2" in 1/8" sheets ... Rod  
Cutting 3/16", 1/4", 5/16" and 3/8" round  
bars. Ask for Descriptive Folder.



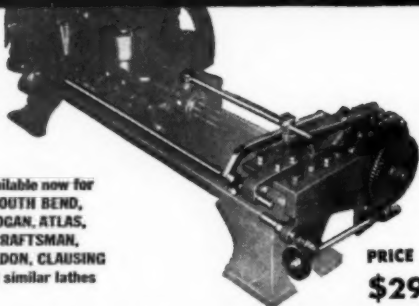
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and similar lathes



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• HERE is relief from manpower shortage and losses from rejects incurred by operator inexperience and fatigue—a practical, highly efficient means of greatly increasing output and profits, easily installed on any bench lathe. The unit is very simple in design and of rugged, enduring construction—as foolproof as a mechanical device can be. The set of standard cams will handle almost any job. The member which actuates the cross slide is a torque rod which cushions the shock of forming and cut-off operations, assures uniform feed and accurate repeating, prolongs tool life. An automatic cut-out, quickly adjustable to work of different character, reduces tool spoilage and parts rejection. A Schrader-engineered 3-way valve operates any collet closer. Put this easily installed, money-making unit to work for you now. It will pay its cost in less than 30 days!

### NEWTON MANUFACTURING COMPANY

706 North Heliotrape Drive • Los Angeles 27, California

#### SPRAYING EQUIPMENT

Spray guns and related equipment for application of industrial finishes to various metal products have been an important link in the production chain for some time.

There are some places in which a spraying method is used on flat materials, that would ordinarily be painted by other methods.

One instance is a combination of a conveyor, (on which the material travels) an air compressor unit, one or more pressure feed spray guns, and an exhausting system. The gun nozzles pass back and forth over the work.

One gun, or several, can be mounted on a reciprocating carriage for this purpose. The arrangement is such that the spray shuts off automatically as a nozzle passes over the edge of the work.

This machine is adjustable and controllable for a wide variety of work. The coatings can be regulated from a control on the side, while the unit is in operation.

When more than one spray gun is used, different colors can be sprayed in the same operation if desired, obtaining two-tone or rainbow effects, or producing spattered and veiling finishes on the material. Sheet metals are among the materials finished on this unit to advantage.

Modern spray guns, held in the hand of the operator, have been much improved in recent years. Some of them need not be dis-assembled for cleaning, and can have the width of the spray ad-

justed from round to flat, with all intermediate widths.

There is complete atomization at all times, with the result that it is easy to lap without leaving streaks. The guns are so made that it is impossible for paint or other finishing material to come in contact with the air control parts.

Pressure feed containers that facilitate the use of multiple colors, for finishing materials, are readily obtainable, from manufacturers of paint spraying equipment. They are worthy of consideration in any sizable plant having use for a number of different colors, intermittently.

THE  
*New*

**DEARBORN**  
MODEL  
"B"

**CHUCKING**

**and INDEXING**

**FIXTURE**

**FOR USE ON MILLING MACHINES**



The Dearborn Fixture meets the demand for automatic chucking and indexing, permitting several operations on the same piece with only one setting. Its simplicity of design, high precision, milling accuracy and speed of operation has led to its adoption by many of the leading manufacturers thru-out the country.

Work held by automatically opening and closing collets  
Work automatically ejected  
Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces.

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**J. W. DEARBORN**

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**DIX**

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DIX Universal Joints come in 15 standard sizes, from  $\frac{3}{8}$ " to 4" Hub Diameter made to Army, Navy, Air Corps spec. AN-40236 ready to install, or can be made to customer's specifications. Eliminate "rejects" with DIX Universal Joints! Write, wire for catalog, prices, specifications, etc.

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Wherever perfect-functioning joints are required — Dix Precision-Made Universal Joints will give the utmost performance and satisfaction. Let Dix engineers help solve your problems.

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MADE  
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Also Internal, External  
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MANUFACTURERS OF  
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*Gear Specialists*

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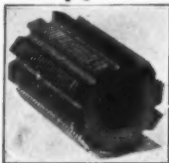
## SAVE Labor and Time

Eliminate  
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swivels and locks in any position. Can be varied 15½° by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

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EXPANSION- AND RADIAL RELIEVED FORM CUTTERS,

Regular or Interrupted tooth form

INVOLUTE SPUR GEAR CUTTERS—14½°; 20°; & 25° P.A.

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### NOW AVAILABLE FOR PRODUCTION USE

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These boxes can now be furnished to Defense Plants for handling of parts in production and assembly, when used as portable containers.

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SHEET METAL DIVISION

## "DUPLIX" Nut Slotter!

*Special Purpose Machine*

**Slots 2 Sizes  
at Once . . .**

Two continuously operating conveyors  
... Highest obtainable production ...  
Automatic burr removal ... As high  
as 3000 slotted nuts per hour ... Two  
machines covering hexagon sizes from  
 $\frac{3}{8}$ " to  $2\frac{1}{2}$ " ... ALSO ADAPTABLE  
TO MILLING OF PARTS OF SIZES  
COMPARABLE TO NUTS.

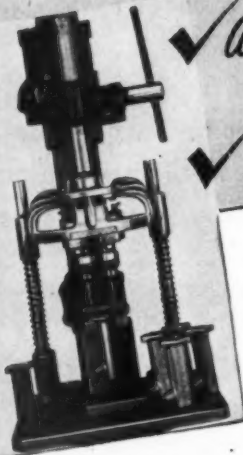


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# TWO SPINDLE *Adjustable* DRILL HEADS

Drill Two Holes At Once



✓ *Adjustable Centers  
from 1/2" to 6"*  
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Sleeve and overarm types . . . in several sizes. Will double output of any single spindle drill press.

Quickly adjusted to desired drill centers from 1/2" to 6".

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**LINDERME MACHINE & TOOL CO., INC.**

12253 Coyle Ave., Detroit 27, Mich.

## TOOL CRIB EQUIPMENT

One thing that has speeded operations in the busy tool crib, is the use of special tool trucks, equipped with tray-type shelves. As a rule, the top shelf is not very high, and only two or three shelves are incorporated on each truck of this kind.

The idea is that one can collect or distribute several relatively heavy tools at one trip, with such a truck, and do it with ease, where otherwise a number of trips would be involved, carrying these relatively heavy items. This would soon be productive of fatigue. Trucks of this

kind are usually kept right in the crib, for use of the attendant only, but in some plants they are allowed to go into the shop, carrying a number of tools for a given job.

There is another type of equipment that can hardly be called a truck, and is more on the order of a portable work bench. This may contain drawers, tool racks, drill and reamer racks, compartments and tool chests. Layouts of this kind are especially convenient in some shops where frequent need of a given group of tools is likely to occur, from time to time, or where relatively large lots of tools may be drawn from the crib by maintenance gangs, or special groups of production workers.

Such workbenches may be kept in the tool crib, or under control of the toolcrib attendant, during periods when they are inactive, and special tools never used for any other purpose may be left in them permanently.

It is the duty of the crib attendant, of course, to check the tools in and on each of these units each time it is turned in; in order to keep proper control over them.

Tool checks are available from many different sources, and may be had in various shapes. Steel, brass, nickel, silver and fiber are all used for making tool checks, and there are also firms which provide special rings for holding checks.

The tool check method of fixing responsibility for tools borrowed from the crib is too long established for any comment.



## A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.



**J. C. BUSCH COMPANY**

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ENGINEERS AND MACHINISTS  
SINCE 1907

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*New*

**LIGHTWEIGHT  
TORQUE WRENCH  
FOR  
LIGHT ASSEMBLY!**

Accurate to  
inch-ounces!



Patent  
Pending



This new lightweight torque tool gives accurate readings of low torques required in delicate radio, ignition and fuel line assembly... in work with plastics and light metals where proper tension must be obtained but where too much pressure may damage the part.

An addition to the Apco Mossberg line of torque tools, it weighs as little as 6 ounces and fits any standard socket. Aluminum handle and sturdy brass scale with easily read figures. In six sizes: 0-100 inch ounces, 0-15, 0-30, 0-60, 0-100 or 0-250 inch pounds. Order yours today.

**APCO MOSSBERG COMPANY**

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Other Apco Mossberg Torque Tools in Higher Ranges



## ADAPTABILITY... used to doing the unusual

Does some part of the product you make present an unusual problem? You are under no obligation when you ask our consultant service for help. Our engineering thinking and our machines are both adapted to doing the unusual. And chances are that a cold-forged part will be more economical for you.

*A Decimal Equivalents wall chart signalled in three colors is yours at no cost or obligation. Just send us your name, title and address.*

See our Catalog in Sweet's  
File for Product Designers.

### JOHN HASSALL, INC.

Specialist in Cold-Forging  
Since 1850

411 Oakland St., Brooklyn 22, N. Y.



## FATIGUE OF METALS

Ever since it was positively demonstrated that metals subjected to bending moments, or to vibration, were susceptible to fatigue and breakage, manufacturers of machinery have endeavored to design parts and mechanisms so they will have the greatest possible resistance to fatigue, and yet keep within a reasonable manufacturing cost.

This is the basis of super-finishing, where such a high polish is put on parts that simply must not fail in service. This is the reason fillets are included, and sharp corners, both interior and exterior, are carefully avoided, for a crack starts

in a sharp corner very easily, and the more easily if it be an internal corner.

Aluminum assemblies have been something of a problem, with reference to threaded connections subject to fatigue. The great value of aluminum in construction, because of its lightness, has urged men to search for a screw thread system which would strengthen aluminum threads, and make them more resistant to fatigue. At least one company has found an answer to this problem, thru the combination of a couple of very interesting principles.

One of these is the use of a circular-section thread, (instead of standard threading, which has sharp angles at bottoms of the threads) for the studs or screw parts. The hole which is to receive the studs or screws is tapped out considerably larger in diameter, and with a modified American National thread.

An intermediate member is used between the screw and the part into which it is placed. The intermediate member is a helical coil insert of phosphor bronze or stainless steel, made so that it fits the modified vee thread on the one side, and the circular screw thread on the other.

With this arrangement, any stress falling on the screw, or stud, is distributed over two sets of threading, instead of one. Fatigue resistance is increased materially over similar assemblies which have single and standard threading.

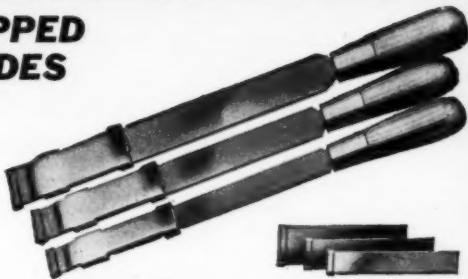
It should be observed that different types of fatigue testing machines have been developed and are used on parts,

## CARBOLOY TIPPED SCRAPER BLADES

Available in three widths to fit the Anderson standard line of hand scrapers. Simply remove the high-speed steel blade and slip in the Anderson Carboloy Tipped Blade.

If you are already using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades.

Speed up your scraping operation with



**THEY LAST 8 TO 10 TIMES LONGER**

these more efficient, longer lasting blades. They are especially good for the new hard alloy iron and the extremely hard bronze castings used in war equipment.

Write for  
**BULLETIN 2-5**

ANDERSON BRO. MFG. CO.

**Anderson**

ROCKFORD, ILL. U.S.A.

Buy More  
**BONDS**



## TIME TO TOOL

## for Post-War Production!

Replace Old, Worn-Out Machines with

# GEMCO

**Multi-Purpose SHAPERS**

These features will help you produce better products—more speedily, accurately, economically:

- 1—Sturdy, powerful construction; 2—Utmost precision in workmanship and performance; 3—Dependability under continued severe service; 4—Ease and convenience in operation; 5—Advanced type of force feed lubrication; 6—“LUBRIGARD” Safety Device increases the Precision Life.

Write Today for Bulletin GC-12B

In 16",  
20" and  
24" Sizes



## GENERAL ENGINEERING & MFG. CO.

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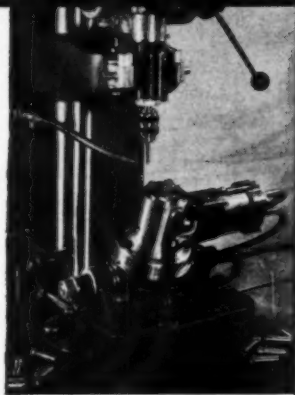
Manufacturers  
of  
**PRECISION  
MACHINERY**  
Since 1917



*One Piece Every 3 Seconds*  
**THAT'S JUMPING PRODUCTION!**

Standard Zagar Air-O (Air-operated) Fixture used with new Warner & Swasey Precision Tapping and Threading Machine turns out one piece every three seconds! Fixture is tipped about 20° to load and unload. Standard 14-AC No. 2 collets are used. Merely stepping on treadle tilts for loading; releasing returns spindle to vertical. Collet does not move vertically in closing. Close tolerances in second operations easily held.

*More work, better work, lower cost.*



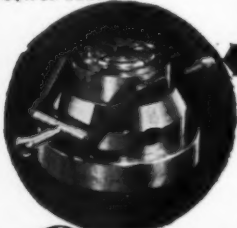
**Also - Zagar SHORT Index Fixture**

Designed for use on small milling machines, 1" and 2" sizes. All the advantages of Zagar Indexing Fixtures.

*Get new Zagar Catalog "B"*

**ZAGAR TOOL, INC.**

23882 Lakeland Blvd., Cleveland 17,



**Zagar INDEXING  
 AND HOLDING FIXTURES**

**NOTCHING**

There are some kinds of machines that can be used to advantage for certain types of notching, but cannot be considered very versatile in this respect, since they are designed only for a given type of work.

Possibly the most versatile unit for this duty, is a special metal-cutting bandsaw, so mounted in relation to the worktable that the column carrying the bandsaw wheels can be tilted to 45 degrees either right or left.

This is especially useful where it is necessary to cut different kinds of notches in bar stock, pipe, structural sections,

moldings, tubing, etc.

The column also travels to the work, so that the work-piece can be clamped rigidly to the table in a given position, until the saw blade is fed into it for the required depth of cut. Then it is backed out, and the work is repositioned for cutting the other side of the notch.

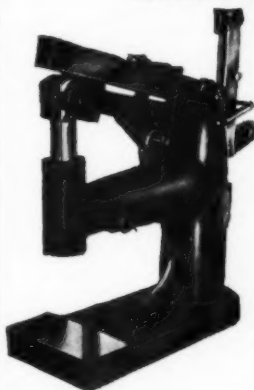
Where a great deal of standard notching is done on structural shapes, a press in connection with a die is often used for the work. To facilitate this type of operation, some firms provide special notching dies, which require no connection to the press ram whatever. The punch is hinged to the unit base, so that it is always in positive alignment, whether it is in the press or in storage. The combined punch and die are always normally held in open position, by an incorporated spring.

The descending ram simply bears on the hinged punch to notch a

piece of work which has been put into place in the die. Such notching dies may be used singly, or they may be spaced into a press in multiple, by securing them in the desired relative locations on press bed.

Do you have a shop in which an amount of relatively light angle iron is used in construction from time to time, yet not enough to pay for maintenance of a press? Such shops sometimes use hand-operated, angle iron combination machines, which will shear, notch and bend an angle iron to a 90-degree corner. Notching methods used depend on the particular type of work and the amount of it to be notched.

## AUTOMATIC STAKING MACHINE INCREASES PRODUCTION With Unskilled Manpower!



### Outperforms conventional Riveters on numerous jobs.

A shortage of skilled workers won't upset your staking machine production if you use the Automatic Staking Machine which, even in unskilled hands, is fast, accurate and thoroughly dependable.

Uniform blow of hammer makes it ideal for riveting movable joints; can be quickly and easily adjusted for various jobs.

#### Available in Three Sizes

Stroke .....	1"	1-B	2"
Spindle .....	2"	2"	2 1/2"
Throat Depth .....	1"	1"	1 1/4"
	4 3/4"	4 3/4"	8 1/2"

Now's the Time to Write for Descriptive Material  
and Prices.

#### WEBER MACHINE CORP.

59 Rutter Street

Rochester 6, New York



## MECHANIZE Hand Reaming with the CATSKILL Model R Power Reaming Machine

SPEED UP hand reaming to  
production line tempo! SAVE  
time, effort, money!

Compact, plug-in unit. Ideal for  
reaming, de-burring, lapping,  
chamfering, and special tool ap-  
plications. A truly versatile power  
tool.

RANGE of SPEEDS  
AVAILABLE

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**CATSKILL METAL WORKS, INC.**  
CATSKILL, NEW YORK

Bench or Pedestal Type  
**MODERATELY PRICED**



## LEVER-LOCK BORING BARS

1. Sizes down to 3/16" diameter.
2. Eliminates use of solid forged bars.
3. Tool bit held on extreme end of boring bars.
4. Full clearance to bore or thread to bottom of blind hole.
5. Each bar has 15° holding channel in one end, right angle channel in other.
6. One precision ground thread tool bit and one boring bit furnished with each bar.
7. Complete set of 4 packed in sturdy wood box \$8.70.

SPECIFICATIONS				
Dimensions of Boring Bars		Size of Cutters Round	Used with Clark Tool Holders Nos.	
Diam.	Lgh.			
3/16	5	3/32	P60R, P61R	
1/4	6	1/8	P60R, P61R, P62R	
3/8	7	3/16	P61R, P62R, P64R	
1/2	8	1/4	P62R, P64R	

Call Your Clark Cutter Jobber Today or Write for Catalog MTBB-2

CLARK  CUTTERS

*Robert H. Clark Company*

9330 SANTA MONICA BOULEVARD • BEVERLY HILLS, CALIFORNIA

### PHYSICAL PROTECTION

Industry in general is paying increasing attention to various means of physical protection of employees. Some do this because of humanitarian motives; others merely to protect themselves against higher insurance rates, greater employee turnover, etc. Many of these things are being watched closely in the metal-working industries.

Only those who have observed severe cases of dermatitis realize how troublesome it can be. Persons who have seen it, never fail to take all possible precautions against it.

Since it is known that dermatitis often



*...The exclusive Clark Lever-Lock securely grips the tool bit.*

results from continued contact with cutting oils, that are allowed to remain on the skin for considerable periods of time, different employers provide adequate wash fountain equipment for all who may need it. Not only do they provide such equipment, but they urge its frequent use.

Fountains of circular type, each one of which will take the place of 8 to 10 single-person wash basins, are in use. These have deep, self-flushing bowls.

The fight against dermatitis is also conducted by the worker, by use of additives for cutting oils, which are designed to kill germs the oil may contain, thus protecting the workman.

Such germicides, compounded particularly for use in cutting oils, are available from various sources, and will maintain practical

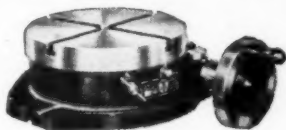
sterility without corroding the metals being worked, or without affecting the wetting and cooling power of oils being used. Some of these additives also prevent spoilage of cutting oils, with consequent foul odors arising from them.

Athlete's foot is responsible for much absenteeism and impaired efficiency in some places. Many firms keep a special powder on hand, convenient for employees to use before beginning work and also at quitting time.

Even the protection of ears of men who must work in very noisy locations has not been overlooked. Some provide special ear stoppers of plastic or rubber.

**BRAND NEW  
PRECISION**

# ROTARY TABLES



9"	— \$ 97.00
12"	— 160.00
15"	— 185.00
18"	— 220.00
18"	— 350.00 Extra Heavy Duty

OUR ROTARY TABLE WILL TAKE THE PLACE OF A COSTLY FIXTURE. IT IS USED FOR ALL KINDS OF WORK ON MILLING MACHINES, SHAPERS, DRILL PRESSES AND HORIZONTAL BORING MILLS.

**WE CAN ALSO FURNISH DIVIDING ATTACHMENTS.**

*SEND FOR LITERATURE AND DETAILS.*

**FAST DELIVERY GUARANTEED.**

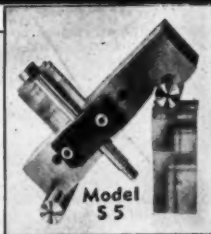
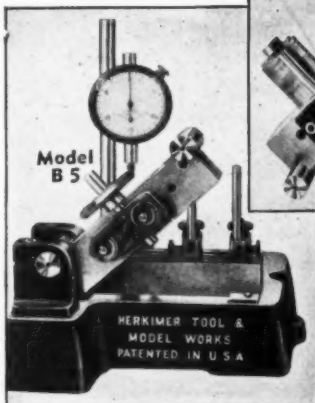
*Send for Literature of other tools.*

**LAFAYETTE TOOL & SUPPLY CO.**

128 LAFAYETTE ST.

NEW YORK, N. Y.

## *Simplified* BEVEL GEAR GAUGING



**No Difficult Operations,  
Involved Calculations or  
Intricate Manipulations.**

With one set-up on these tools, any operator with ordinary gauging experience and a knowledge of blue print reading, can perform these

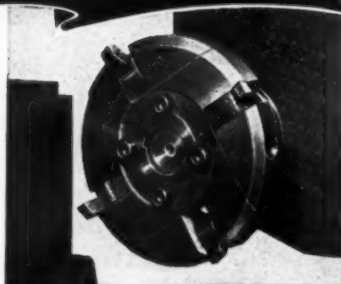
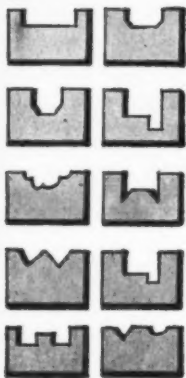
three important operations:

1. Check dimensional accuracy of the addendum cone (gear face) as related to thrust face of hub.
2. Check accuracy of cone angle.
3. Check run-out of gear face.

*Write for descriptive folder.*

**HERKIMER TOOL & MODEL WORKS, 1010 George St., Herkimer, N. Y.**

# Newfield UNIVERSAL FLY CUTTER



Above: FACE MILLING

## STANDARD BITS MAKE 4 TO 6 DIFFERENT CUTS IN 1 OPERATION!

For many types of milling, light metals and plastics as well as steel, there is no longer need for special cutters. A single Newfield Universal Fly Cutter, utilizing any type of standard high speed steel or carbide bits, makes multiple cuts in one operation. In contrast with expensive specially ground cutters, the standard bits used in the Newfield are easily and quickly ground in your own shop, readily replaced or reground for other work, at small cost. There is practically no down-time if a bit is broken.

The Newfield fits all standard arbors, turns to any required speed for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Standard sizes are 4", 6", 8", 10". Write for details of this versatile, production-upping, money-saving tool.

*Above—a few of the many cuts that can be made with the Newfield Universal Fly Cutter in ONE operation on a horizontal or vertical mill or drill press. Individually adjustable bit holders permit slots of any shape to be cut 3/16" to 1-1/2" wide.*

## NEWFIELD MACHINED PARTS COMPANY

7160 Melrose Avenue, Los Angeles 46, California

### MUNITION SHORTAGES

Drafting of a relatively few highly skilled workmen is one of the important contributing causes of the present munitions shortage, Samuel J. Kornhauser, President of National Tool Co., declared recently in a plea for the release from the armed forces of a handful of key shopmen.

The loss of no more than a dozen irreplaceable, expert grinders, he said, has made it impossible for his company to keep up with orders for cutting instruments used in making precision gears and other parts which are prerequisite to

duced, the effect on ultimate production is profound and far reaching. The fall in the number of cutters produced, due to the loss of even one such grinder, affects materially the quantity of airplanes, guns, tanks, shells and other munitions which can be produced. The extent of that quantity is dependent on high-precision gears and other accurate parts which can be fashioned only thru the use of suitable cutting tools.

"Thus, obviously, it is a short-sighted policy that prompts taking any of this small reserve of experts for ordinary military service.

production of the most vital military equipment.

"Gear shaper cutters and ground hobs required to cut highly accurate gears, as well as form tools and other special cutters needed to produce shells, guns, engines, and other varieties of war instrumentalities, are made according to particular designs and specifications.

Like any metal cutting device, they wear out and must be constantly replaced. If the flow of these tools lags, "Mr. Kornhauser said, "war production, in turn, falls behind.

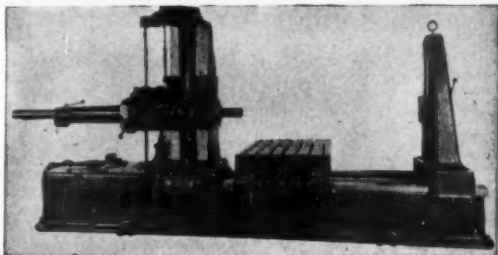
"It takes not months, but years, to develop hands capable of performing adequately the critical grinding operations involving microscopic tolerance limits.

Not many possessing this exceptional talent and training are required; but if the necessary minimum is reduced,



# PORTAGE No. 4

HORIZONTAL BORING, DRILLING & MILLING MACHINE



Designed and built to meet the need for speed and accuracy demanded of today's production.

## WRITE TODAY

for fully illustrated bulletin giving detailed description of the many features of this Horizontal Boring, Drilling and Milling Machine. No obligation.

**THE PORTAGE MACHINE CO.**  
AKRON 11, OHIO

Accurately holds the depth at the same time it automatically centers parts for drilling, milling, tapping, etc. Needed in every plant where second operation work is done. Also for assembly or wherever a holding fixture to do precision operations is needed. Uses Brown and Sharpe type screw machine collets and simplifies "setting-up" operations and in most instances eliminates the making of jigs or fixtures.

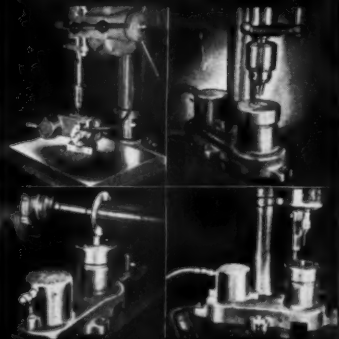
Has low consumption of air and its simplicity of construction eliminates expensive repairs.

Four models—No. 00—No. 0—No. 2 and No. 2 Special. Collet capacity from 1/16" to 1 3/4".

Literature on request.  
Write for Catalog Sheet.



**Redmer**  
AIR CHUCK



**REDMER AIR DEVICES CORP.**  
808 W. WASHINGTON BLVD., CHICAGO 6, ILL.

# IDEAL SPEED LATHES

For accurate, uniform, speedy finishing of metal & plastic parts.



AWARDED  
October '43

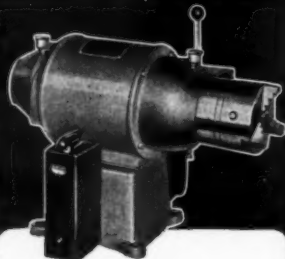
NA1E



NA1C



VA1B



POLISH • LAP • DE-BURR • FINISH

**NA1B** (above) - for general finishing of gears, pulleys, dies, and other large pieces - metal or plastic.

**NA1E** - foot-operated collet type, for high-production finishing of many identical small parts.

**NA1C** - with hand- or foot-operated collet, to take up to 1" round stock.

**VA1B** - variable speed lathes, in bench and pedestal models, chuck and collet types.

If you have a finishing problem  
WRITE FOR CATALOG 440

## SCHAUER MACHINE COMPANY

ORIGINATORS OF TODAY'S SPEED LATHES  
2064 READING ROAD ..... CINCINNATI 2, OHIO

### GRINDING ATTACHMENTS

There are various cases where the application of some special attachment or fixture allows special grinding operations that could not otherwise be handled in a given shop.

Also, there are cases in which given grinding operations on standard machines have been speeded. An instance of special grinding is found where a cup-type wheel is held and revolved on a mandrel, in a staunch drill spindle. Special grinding fixtures, for holding special tools on the drill table, and advancing them to the cup wheel on the spindle in the prop-

er position, is employed. End-milling cutters, counterbores, and facing cutters are sharpened with a layout of this kind.

V-block clamps are employed to hold the tool shank, and the V-block has both a lateral and a swiveling adjustment. An adjustable stop is provided, on which the end of the tool rests, to position it for height.

Drill grinders are available for use in plants where there are many drills to be maintained and pointed.

Drill-grinding attachments are provided by one maker of pedestal type tool grinders, however, which can be attached to his general purpose grinders of pedestal type. The face of the wheel is used for grinding, when this attachment is employed. Micrometer settings are obtainable. Just enough of the heel of the drill is ground away to provide proper clearance, without any weakening of the cutting edge.

In a very short time, an inexperienced man can do a perfect job of drill sharpening with this device.

Some men, using internal grinders, prefer side-loading fixtures for them. In other cases, it is necessary to load from the side, regardless of preference.

On high-production internal grinding, this has often reduced the production rate, because of additional time consumed by the operator opening the chuck guard.

To overcome this, one manufacturer of modern internal grinders developed a hydraulic valve and cylinder layout, which opens the chuck guard automatically.

## **MATTHEW** Patented

### **ROTARY TOOL CARRIER**

is indispensable for finishing a complete multiple contour or irregular shaped milling job in ONE setting without use of Rotary table.

Capacity up to 7" diameter circle. Will fit any horizontal milling machine or can supply a suitable machine if required. Spindle speeds, standard 600 to 2800 R.P.M.

Rated capacity 1" end mills in steel.

Highly recommended for Metal Pattern, Molds of all kinds, Die Cast Dies, etc.

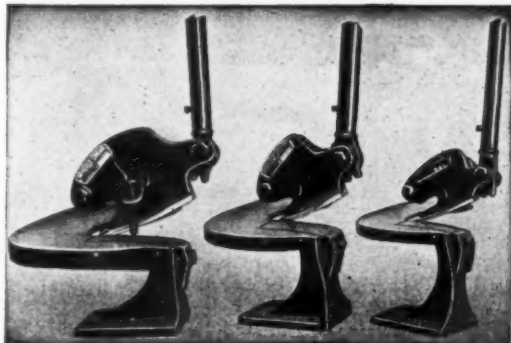
A quick self liquidating capital investment.

*Descriptive matter on request.*

### **PRODUCTION MACHINERY DEVELOPMENT COMPANY**

4845 St. Aubin St.,

Detroit 7, Michigan



**Get  
BEVERLY  
Throatless  
SHEARS**

### **SAVE TIME ON WAR ORDERS!**

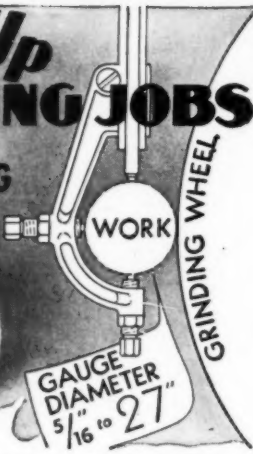
If you're cutting straights or irregulars on War orders you can speed 'em up with a BEVERLY Bench-Type Shear. Order No. 1 for 14 Ga., No. 2 for 10 Ga., No. 3 for 3/16" mild steel and 10 ga., stainless.

**THE BEVERLY SHEAR MFG. CO., 3005 W. 110th Pl., Chicago 43, Ill.**

# Speed Up GRINDING JOBS

With Automatic  
DIAMETER INSPECTING  
GAUGE

VISUAL  
READING  
DURING  
GRINDING



Pratt Grinding Gauges caliper external cylindrical jobs while work is in motion or at rest. Adapted to straight or tapered work. Tolerances of .0001" plus or minus easily maintained. Visible check on out of roundness, rough grinding and chatter. Cannot grind work undersize unknowingly. Easily installed on any grinder. Pratt Grinding Gauges increase production, eliminate scrap and assure accuracy. A modern precision tool, ruggedly built.

Send for Bulletin

## American

**DIAMOND TOOL & GAUGE CO.**

15920 WOODINGHAM • DETROIT 21, MICH.

### MAGNESIUM

All the way along the line, where magnesium is being handled, care must be employed because of its inflammability. Where you are tumbling magnesium in oil, there is of course an added hazard.

It follows that if a tumbling medium can be found which is stable enough to withstand wear, has sufficient weight to work well, and cannot possibly strike a spark because it is non-metallic, you have a medium that is ideal for the purpose.

It is interesting to know that balls of lignum vitae wood, a very hard and heavy tropical material, are used success-

fully for this purpose, and are provided by specialists in lignum vitae products.

It is one thing to prevent magnesium fires by taking proper precautions; it is another thing to stop them. It is very difficult to extinguish a magnesium fire, because the material burns at such an exceedingly high temperature. Much of the metal is likely to be lost, in addition to other damage caused, if a fire starts.

There is, however, a special material in the form of granules that can be spread over the fire. Granules soften under the heat and form a sealing blanket over the fire, which cuts off air and oxygen contact, and thus quickly extinguishes the blaze.

Magnesium can be obtained in different alloys, in the form of rods and bars, tubing, forgings, sheets, ribbons, strips, etc. Extruded shapes, wire, and castings are also available. Exceptional care is

in order and is universally practiced in grinding the material, due to the chances of sparks from grinding wheels causing trouble. Special grinding booths which remove any inflammable magnesium dust from the air have been designed for this purpose.

One such booth is provided with wood grilles, on which work being ground is laid. Grinding and polishing is done with portable tools. All grinding dust is at once drawn thru the grilles by air action, and is drawn thru sprays of water coming from pressure nozzles. This converts dust to a non-inflammable sludge.

# C-F POSITIONERS

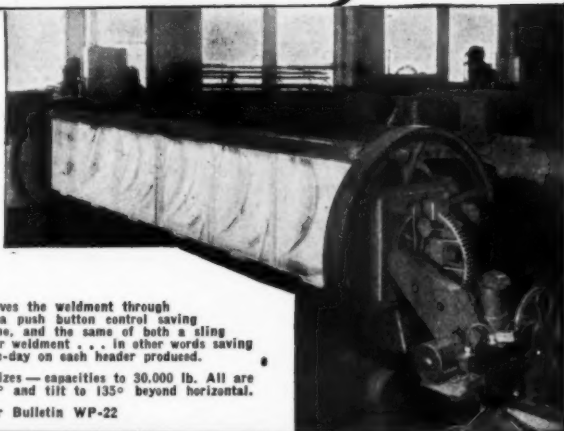
## SAVE 72 LIFTS

The Nordberg Manufacturing Co., Milwaukee, have eliminated 72 lifts per unit by using a C-F Positioner on the production job illustrated. These complex weldments (Scavenging air headers for large Diesel engines) have to be "procedure-welded" and formerly required 72 crane lifts which took an average of 20 minutes apiece.

Now, the C-F Positioner moves the weldment through the routine positions under a push button control saving 24 hours crane operator's time, and the same of both a sling man and the welder's time per weldment . . . in other words saving three man-days and one crane-day on each header produced.

C-F Positioners come in 8 sizes — capacities to 30,000 lb. All are pedestal mounted, rotate 360° and tilt to 135° beyond horizontal.

Write for Bulletin WP-22



CULLEN-FRIESTEDT CO. 1321 S Kilbourn Ave. Chicago 23, U.S.A.

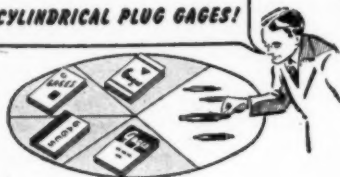
### PRODUCTION NOW and POST-WAR

Manufacturers of automotive vehicles, aircraft, radio, etc., for war and peace, will find this a dependable source for all types of metal fabricated parts. Our facilities for *stamping, forming, drawing, machining, welding, brazing, soldering, riveting, plating, polishing and painting* are unexcelled. Our equipment is modern and our labor is stable. Tell us what you need and get our proposition. No obligation.

COLUMBUS SPECIALTY COMPANY • COLUMBUS, INDIANA



*I Want the Best Product in  
CYLINDRICAL PLUG GAGES!*



## Consider the SUPERIOR PRODUCTS

There are gages and gages. United Precision specializes in one division only—Cylindrical Plug and Pin Gages. All its engineering experience, and ample modern facilities go into the perfection of the types of gages under this division.



# DUB LIFE PLUG GAGES

An outstanding example of United Precision's achievement.

2 "Go's" and 2 "No Go's" in same handle. When either plug becomes worn, reverse it and you have a brand new gage. Double-life! Save time. Save gage money. Finest gage steel. UPPCO lapped or chrome-plated. UPPCO lapped. Tolerances to .00002".

Complete Pin Sets in Cabinets.

Number Drill, Letter Drill and Fractionals.

Send for complete Gage Catalog.

Other gages of A.G. Design. Wire or write



UPPCO  
Pin Sets  
in Cabinets.

## UNITED PRECISION PRODUCTS CO.

3522 West Belmont Ave., Chicago 18, Ill.

### TOOLPOST GRINDERS

Continually increasing uses for toolpost grinders have resulted in greater production of different models of these little machines. Some are for very light work, and others for jobs where considerable material must be removed.

One company offers a very small unit, ideally suited for use with small bench and shop lathes. Because of its diminutive size, it has been called the Tom Thumb.

Another very small size toolpost grinding setup is accomplished in some places with a little air-driven grinder, which revolves small mounted wheels, etc., at

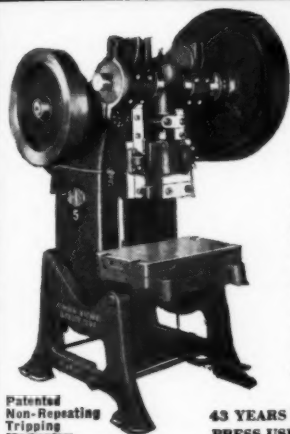
50,000 rpm. The case in which this grinder is mounted, has a relatively small cylindrical section, which is easily grasped and held in a special clamp. A toolpost adapter incorporates such a clamp, and is used in connection with this grinder, when desired.

Special toolpost grinders have been used in some instances for grinding slitting knives, while the latter were in place on the rollers. Doing the sharpening job in this manner, instead of tearing down the rollers, is reported to save one full day of time. It is possible that there are other places where similar savings could be realized on circumferential grinding at machines, whether it involves the sharpening of disc-type knives, or not. The idea is certainly worthy of remembering.

Heavy-duty toolpost grinders which can be used, not only on lathes, but can also be applied to shapers and the

planers are kept on hand in some shops. One can be applied to internal, external, face and taper grinding on a lathe. It is designed to grind holes as deep as  $3\frac{1}{2}$ ". The quill assembly on this unit is dynamically balanced, so that a smooth job of grinding can be obtained at all times.

Possibly you have noticed flexible shaft toolpost grinders at work here and there. These have the driving motors for the shafts mounted on three-legged stands, which are placed adjacent to the lathes while the equipment is in use. One such unit noticed is heavy enough to grind large rolls, ring dies, etc.



Patented  
Non-Repeating  
Tripping  
Mechanism

## UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send for illustrated catalog describing complete line TODAY.



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**JOHNSON MACHINE AND PRESS CORP., ELKHART, INDIANA**

## STOP DRILL, TAP AND REAMER BREAKAGE with BUFFALO TORQUE CONTROL COUPLINGS

Based on the fact that torque and inertia are the fundamental principles of all drilling, reaming and tapping operations, the BUFFALO TORQUE CONTROL COUPLINGS are designed to eliminate drill, tap and reamer breakage by acting as a safeguard between the driving power and the tool.

When adjusted at a fixed torque to perform a particular operation, these couplings automatically throw out when over-loaded, thereby severing the driving power thru the coupling itself, but automatically re-engage and re-assume the driving power when the overload has been removed.

Available in single and multiple disc types, in sizes for all operations on drilling machines, lathes, turret lathes, horizontal boring mills, etc.

Also manufactured as STUD DRIVERS, NUT SETTERS AND TRANSMISSION TYPES.

Write for complete descriptive Bulletin No. 1005 today!



Machine  
Tool Type

**BUFFALO MACHINERY CO., INC.**  
838 Grant Street Buffalo 13, New York

# Proper SPEED Ample POWER

For All Your  
**PORTABLE  
GRINDING JOBS**

You get the surface speeds and power at which small wheels work best in these Onsrud Air Turbine Grinders. From top to bottom, they are the B-1, 75,000 RPM; the MD-1, 50,000 RPM; and E-1, 38,000 RPM.

Get complete details on these highly efficient, practical tools. Write for free Grinder Bulletin.

**ONSRUD MACHINE WORKS, INC.**  
3908 Palmer Street Chicago 47, Illinois  
*Sales Offices in all Principal Cities*



**MACHINE TOOLS AND METHODS  
FOR TOMORROW'S PRODUCTION**

## BALL BEARINGS

Out of the pillars of smoke and flames of the Schweinfurt raid on the German ball bearing industries, arose the beginning of the end of the Luftwaffe and crippling of the Reich's aircraft industry.

Ball and roller bearings have been to our Army Air Forces, what the key-stone was to the Roman arch, for without them, perfection of the Norden Bombsight, the Automatic Pilot, the remote-control firing system of the B-29, aircraft engines of more than 2,000 hp, controllable pitch propellers and much other AAF equipment would have been impossible.

The Norden Bombsight, one of our greatest and most secret weapon of the war, without which the effectiveness of our bombing would be greatly reduced, is dependent on 35 different sizes and types of ball bearings, all contributing to the efficient and constant performances of its many intricate parts.

Each sighting station in the B-29, responsible for the defense of the bomber, has 92 ball bearing assemblies.

Maj. Pask lists the B-17 or Flying Fortress as using 3,141 bearings while the P-38 or Lightning fighter plane has 2,138 and a trainer around 401.

This was pointed out recently by Maj. R. J. Pask, of the Bearing Unit, Production Section, Air Technical Service Command at Wright Field, Dayton, Ohio.

That British and American Air Forces elected to suffer some of their greatest bomber losses in order to crush the German ball bearing industry is testimony to the vital role American anti-friction bearing industry has played in this war.

Without one type of bearing in precision instruments, the smallest of all ball bearings, only .1063" in diameter with three steel balls in it, measuring .03937", the delicate aircraft instruments such as the Fuel and Manifold Pressure gauge, Turn and Bank Indicators and Artificial Horizon, would be unreliable, endangering the lives and equipment of flying personnel.

These smallest of all bearings were designed and produced within 10 weeks at the Army Air Forces request.



# E. S. T. GAGES

FOR DESIRED ACCURACY

**We also build  
JIGS, FIXTURES  
and SERVICE TOOLS**

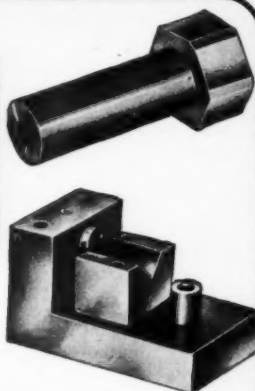
Available in standards, or made to your own blueprint specifications, also chrome plated and carbide tipped. We are prepared to assist your overburdened drafting department in designing your gages and tools. Prompt Delivery.

**E.S.T. PRECISION MANUFACTURING CO. INC.**

103 GREENE STREET

DEPT. M.T.

NEW YORK, N. Y.



*Territories  
open for  
Representatives*

**don't  
be a  
put-er off-er**

**ORDER TODAY OUR NEW "O-P"**  
**ANGLEFEED FIXTURE**  
TABLE TRAVEL THREE AND ONE HALF INCHES

WRITE  
FOR THIS  
FOUR PAGE  
DETAILED  
FOLDER



WEIGHT  
110 LBS.

POST-WAR  
SHOWING

Our NEW "O-P" ANGLEFEED FIXTURE is a POST-WAR PRODUCT — designed for cutting down costs — meet competition, in the tomorrow. This NEW ANGLEFEED FIXTURE has a table travel of three and one half inches, and is adjustable to any desired angle within a few seconds. It can be quickly mounted to the table of any Shaper, Drill Press, Jig-Borer, Boring Mill, Horizontal or Vertical Milling Machine or Surface Grinder. The NEW "O-P" ANGLEFEED FIXTURE is a great timesaver. Don't be a — put-er off-er — order now.

**AUTOMATIC MACHINE & TOOL CO.**  
**ENGINEERED PRODUCTS**  
AUBURNDALE, MASSACHUSETTS

PATENT NO. 2,329,135

132 CHARLES STREET,

AUBURNDALE, MASS.

# Mechanics Through the Ages



**IN ANCIENT**  
TIMES PHOENICIAN NAVIGATORS, IT IS SAID, TRADED LOCKS WITH THE MINERS OF CORNWALL ENGLAND IN EXCHANGE FOR TIN. LOCKS OF THIS SAME ANCIENT TYPE WERE STILL BEING USED BY CORNISH INHABITANTS AS LATE AS THE 1870'S!



**LARGE CLOCK**  
PENDULUMS BECAME SO HEAVY LATE IN THE 1600'S, THAT CLOCKMAKERS TURNED OVER THE JOB OF MAKING THEM TO LOCKSMITHS.



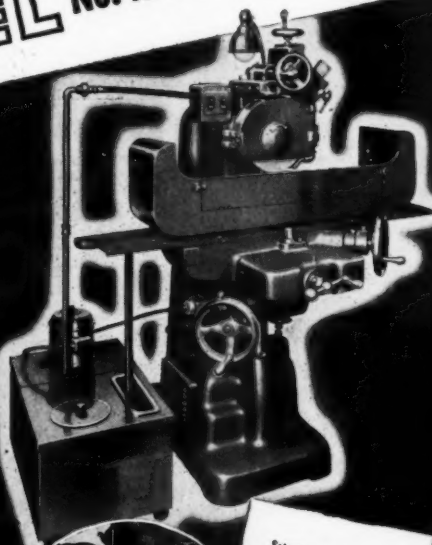
**EARLY** IN THE 18<sup>TH</sup> CENTURY, ONE OF MANHATTAN'S THOROFARES WAS DUBBED "DE SMITS' VALLEY" IN HONOR OF THE DUTCH BLACKSMITHS LIVING THERE.

# *It Can't Happen* WITH A **COVEL** No. 15 SURFACE GRINDER!

Work spoilage means lost time, production, and materials. When a part reaches the surface grinding point, it invariably is 90% finished. Complete loss results should the grinding wheel DROP INTO the work. Such an accident absolutely cannot happen on a COVEL No. 15 because:

## THE SPINDLE REMAINS STATIONARY WHILE THE WORK MOVES UP TO THE WHEEL

This simple but vital design feature is only one of many reasons why plant men prefer the COVEL No. 15.



Set-up on the Covell No. 15 (6" x 18") Hand Feed Surface Grinder. Spindle is stationary; table has full 11" vertical travel. Three spindle speeds make it ideal for short production runs where quick set-up, accurate grinding of odd shaped pieces, mean reduced production costs.

**See Your Nearest Covell Dealer Or Write For Bulletin MT-25.**



GRINDING MACHINERY SINCE 1874

**INDUSTRIAL GRINDERS**

COVEL MFG. CO., BENTON HARBOR, MICHIGAN U. S. A.

**PROMPT DELIVERIES**  
**HIGH SPEED END MILLS**  
**DOUBLE END**



**Two and Four Flutes**

Dia. of Mill	Diameter of Shank	Length of Flute	Overall Length	Net Price
1/8	3/8	3/8	3	2.20
5/32	3/8	3/8	3	2.20
3/16	3/8	1/2	3	2.20
7/32	3/8	5/8	3 1/8	2.20
1/4	3/8	5/8	3 1/8	2.20
9/32	3/8	3/4	3 1/8	2.20
5/16	3/8	3/4	3 1/8	2.20
11/32	3/8	3/4	3 1/4	2.20
3/8	3/8	3/4	3 1/4	2.20
7/16	1/2	1	4 1/4	2.80
1/2	1/2	1	4 1/4	2.80
5/8	5/8	1 3/8	5	3.44
3/4	3/4	1 5/8	5 5/8	4.20
1	1	1 3/4	6 1/4	5.40

**SINGLE END**  
**Two and Four Flutes**

Dia. of Mill	Dia. of Shank	Length of Flutes	Overall Length	Net Price
1/8	3/8	3/8	2 5/16	1.40
3/16	3/8	1/2	2 3/8	1.40
1/4	3/8	5/8	2 1/2	1.40
5/16	3/8	3/4	2 1/2	1.40
3/8	3/8	3/4	2 1/2	1.40
7/16	1/2	1	2 1/16	1.76
1/2	1/2	1 1/4	3 1/4	1.88
5/8	5/8	1 5/8	3 3/4	2.40
3/4	3/4	1 5/8	3 3/4	2.52

**LONG SINGLE**  
**END MILLS**

**Four Fluted**

Dia. of Mill	Dia. of Shank	Length of Flutes	Overall Length	Net Price
1/4	3/8	1 1/4	3 1/8	1.68
5/16	3/8	1 3/8	3 1/8	1.68
3/8	3/8	1 1/2	3 1/4	1.68
7/16	1/2	1 3/4	3 3/4	2.08
1/2	1/2	2	4	2.16
5/8	5/8	2 1/2	4 5/8	2.76
3/4	3/4	3	5 1/2	3.44

**VICTOR MACHINERY EXCHANGE, INC.**  
**251 Centre Street**      **New York, N. Y.**

# PROMPT DELIVERIES

## NEW HIGH SPEED

## SIDE MILLING CUTTERS



Diameter Inches	Face Inches	Hole Inches	Our Net Price Each	Diameter Inches	Face Inches	Hole Inches	Our Net Price Each
2	$\frac{3}{16}$	$\frac{1}{2}$	\$ 2.65	5	$\frac{1}{8}$	1	\$10.00
2	$\frac{1}{4}$	$\frac{3}{8}$	2.77	5	$\frac{3}{8}$	1	10.00
2	$\frac{3}{8}$	$\frac{3}{8}$	3.02	5	$\frac{1}{2}$	1	10.00
2½	$\frac{1}{4}$	$\frac{3}{8}$	3.40	5	$\frac{1}{2}$	1	9.51
2½	$\frac{5}{16}$	$\frac{3}{8}$	3.59	5	$\frac{3}{8}$	1	10.52
2½	$\frac{3}{8}$	$\frac{3}{8}$	3.78	5	$\frac{3}{4}$	1	11.46
2½	$\frac{7}{16}$	$\frac{3}{8}$	4.15	5	$\frac{3}{8}$	1	13.42
2½	$\frac{1}{2}$	$\frac{3}{8}$	4.15	5	1	1	13.42
3	$\frac{3}{16}$	1	4.10	6	$\frac{1}{8}$	1	12.50
3	$\frac{1}{4}$	1	4.10	6	$\frac{1}{4}$	1	12.50
3	$\frac{5}{16}$	1	4.35	6	$\frac{1}{2}$	1	12.50
3	$\frac{3}{8}$	1	4.54	6	$\frac{3}{8}$	1	12.50
3	$\frac{7}{16}$	1	4.79	6	$\frac{1}{2}$	1	12.50
3	$\frac{1}{2}$	1	5.04	6	$\frac{1}{2}$	1	12.41
4	$\frac{1}{8}$	1	5.67	6	$\frac{3}{8}$	1	13.92
4	$\frac{1}{4}$	1	5.67	6	$\frac{3}{4}$	1 or 1¼	15.12
4	$\frac{5}{16}$	1	6.36	6	$\frac{3}{4}$	1 or 1¼	17.89
4	$\frac{3}{8}$	1	6.36	6	1	1 or 1¼	17.89
4	$\frac{7}{16}$	1	7.12	7	$\frac{1}{2}$	1 or 1¼	18.00
4	$\frac{1}{2}$	1	7.12	7	$\frac{3}{8}$	1 or 1¼	18.00
4	$\frac{9}{16}$	1	7.75	7	$\frac{3}{4}$	1 or 1¼	21.67
4	$\frac{5}{8}$	1	7.75	7	1	1 or 1¼	25.39
4	$\frac{3}{4}$	1	8.38	8	$\frac{1}{2}$	1 or 1¼	25.00
4	$\frac{7}{8}$	1	10.00	8	$\frac{3}{8}$	1 or 1¼	25.00
5	$\frac{3}{16}$	1	10.00	8	$\frac{3}{4}$	1 or 1¼	28.00
5	$\frac{1}{4}$	1	10.00	8	1	1 or 1¼	33.64

**VICTOR MACHINERY EXCHANGE, INC.**  
**251 CENTRE STREET** **NEW YORK, N. Y.**

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Burke Machine Tool Co.	339	Economy Machine Products Co.	350
Burr & Son, J. T.	322	Economy Tool & Machine Co.	375
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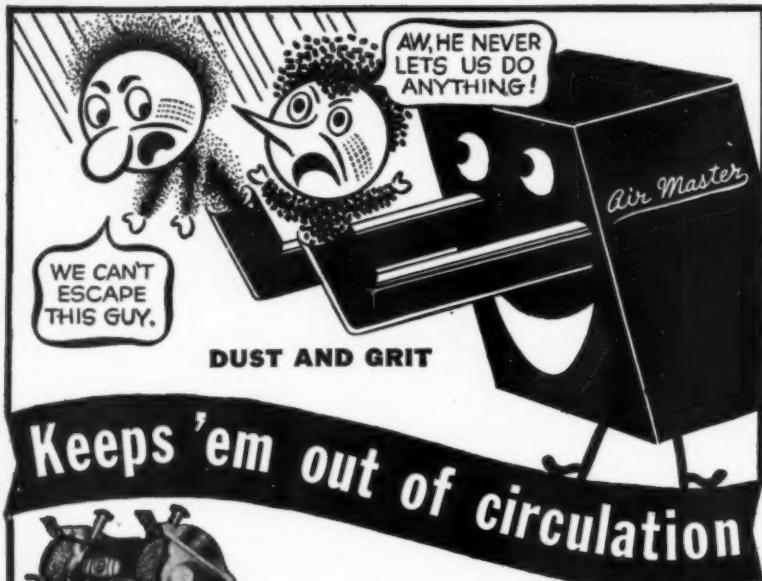
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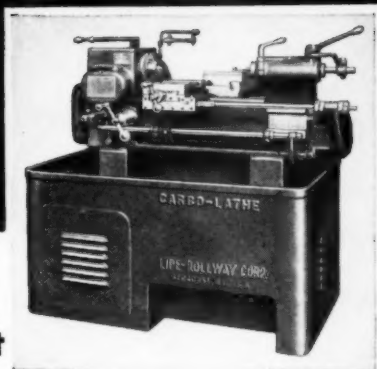
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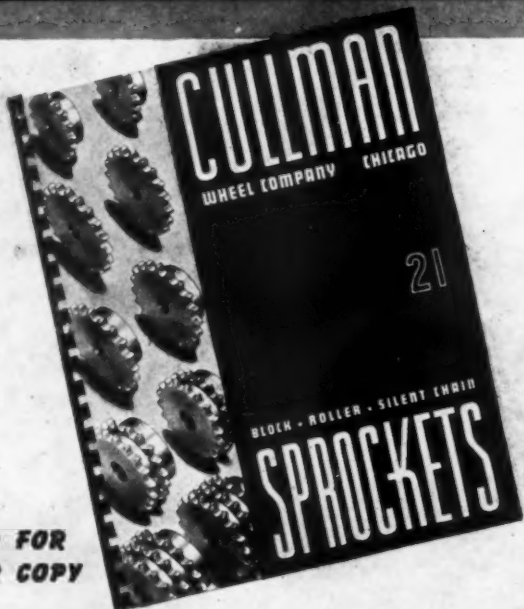
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